RAILROAD GAZETTE

FRIDAY, NOVEMBER 23, 1894.

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Contributions.

Where Do the Profits Go?

NEW YORK, Nov. 15, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The agitation for railroad reform which raged in the New York *Tribune* the third week in August, has apparently been, like previous agitation of a somewhat similar character, quite short lived; as, after a lapse of three months we do not hear of the establishment of a system of independnet expert inspection of the books of a single railroad corporation, as the result of the agitation referred to.

However, the necessity for, and the value of such a system stll exists, and the article by "Z. Y. X." on "The Day of Small Things," and your editorial remarks thereon, in the *Railroad Gazette* of November 2, calls to mind the fact that the full benefits of the proposed system of inspection of books cannot be realized unless the same is supplemented by a thorough examination of the methods of expenditure.

"Z. Y. X." would not give you the details of the economies practiced by his company during the past year, which enabled it to pay a small dividend. I will give you an item of an opposite character. A certain railroad last year contracted for something at a cost of $30,000, whereas it could have obtained something as serviceable *efficient* and for the sum of $12,000. The officer who authorized the expenditure was fully aware of the facts. The railroad referred to *did not* declare a dividend last year; but some months after this transaction went into receiver's hands. Whether the powers that managed the road, and who profited by the receivership, desired such a result, and whether the transaction I have cited was only one of many that led to that result, time and a little expert examination may show. ESHAVA.

The Coupler Standards.

AVALON, Cal., Nov. 1, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you kindly inform me of the rules to be conformed to in the matter of automatic couplings for railroad cars? I gather from your paper that there are certain tests and laws to be complied with. H. A. RISING.

[This sort of information is so often asked that we answer Mr. Rising's letter publicly hoping that it may thus reach others and save time and labor. In the Master Car Builders' *Proceedings*, 1894, Plate 11, will be found the following standards: Length of shank, dimensions of shank for tailbolt and strap, length of coupler over all, contour of coupling faces, distance of buffer-stop from deadwood, carrier iron, slot for continuous draft gear and gages for the limit of variations from standard contour. Remarks about the standards are found on page 420 The proposed standard requirements for drop tests are outlined on page 183. There are no standards for material or for total weight, but it has been recommended that the total weight of one complete coupler should not be more than 220 lbs., and that the shank, back of the head, should be larger than the standard dimensions, namely, 5 inches by 5 inches, and that the fillets between the shank and the head be made as large as practicable. The *Proceedings* can be purchased from the Secretary, Mr. John W. Cloud, Rookery Building, Chicago, Ill. Price, $1.— EDITOR RAILROAD GAZETTE].

The Locomotive and the Rail.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It has been the writer's desire in calling attention to the destructive effect of unbalanced locomotives upon themselves and upon tracks and bridges, to confine himself strictly to statements of actual effects in practice, and not to discuss the defects of motive power beyond the mere axiomatic assertion of the fact that in the locomotives in general use the revolving and reciprocating parts are unbalanced. It was hoped that the assent by silence to the statements made recently in the *Railroad Gazette* upon the locomotive hammer blow, would have induced some motive power expert to suggest a remedy for the defects in the design of motive power. The writer did not consider it necessary to do more than state the facts as he found them, and leave the remedy to be provided by those who make a specialty of motive power work. As the disposition seems to be to allow the writer to almost monopolize this field of discussion, he cannot decline to answer the inquiry of "Engineer" in the last issue of the *Railroad Gazette* to the best of his ability.

He understands that a locomotive can be constructed as follows that will be practically perfectly balanced; Four cylinders, all high pressure, or two high pressure and two low pressure properly proportioned if considered preferable. Arrange them in pairs, two on each side of the locomotive. Arrange each pair of cylinders on each side to have one cylinder take steam at the front end while the other cylinder on the same side is taking steam at the back end. This makes the cranks on the same side directly opposite each other, while the cranks on the opposite side should be at right angles to them. This suggests the much dreaded crank axle which seems to be an every day practical success abroad. It is beleved that a locomotive of the above general design would reduce the motive power and track repairs fully 25 per cent., not to say anything about avoiding an extra expense for heavy rails in order to endeavor to make them strong enough to carry with imaginary security unbalanced engines at high speeds. HEADLIGHT.

[That is what we thought would come. And now build your four-cylinder, balanced engine and run it, and let us know what happens. But let us steer clear of the turbid waters of the theory of the counterbalance and the hammer blow.—EDITOR RAILROAD GAZETTE.]

How to Buy Couplers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I enclose copy of letter recently sent out by Purchasing Agent X, of the Y. Z. Railroad, which I consider a novelty in its way. This letter, addressed to a considerable number of coupler firms is prefaced by the statement that the company proposes to build —— new cars this winter and wishes to equip them with the vertical plane coupler; and that the company also intends replacing couplers on present equipment at the rate of about 50 cars per month.

It seems to me that the series of questions here given merits publication. A better series might be readily formulated, of course; but the mere fact that a purchasing agent takes the trouble to go into the matter in such an approximately systematic manner argues well for the future. Purchases of couplers have, in too many cases heretofore, been decided upon considerations remote from those suggested in the list here given. The considerations named are thoroughly worthy, in my opinion—although they should be supplemented by others; for instance, especially, a query should have been made as to authentic records of actual service. This man is evidently just about soaked with the idea of laboratory, or special tests. I believe in these thoroughly, but also believe that they do not and cannot tell the whole story—they must be supplemented by service tests of long duration. At the same time Mr. X., is starting in in the right way. He has taken the trouble to formulate a series of questions, and especially insists upon a distinct answer to each. Note that he is systematic; even if he has not covered the whole field he has made a brave attempt at it.

I do not believe that couplers should be bought upon records of tests such as we have had. But while purchases should be governed by service records, special test records, considerations of designs, etc., they should still be governed *finally* by inspection tests, as are the purchases of axles, wheels, boiler steel, etc.

I envy this purchasing agent—that is, I think I do. If he receives categorical answers from all the coupler companies now in the field, and properly tabulates them, the resulting data would be worth having.

By the way, where would some of our "representatives" of coupler companies be if the 11th item were insisted upon? P. A.

MR. X.'S QUESTIONS.

Will you please give us the following information, submitting replies in the order indicated, being particular not to overlook any of the eleven paragraphs, giving a separate and distinct answer to each, stating,

First. Approximately how many of your "standard" couplers you now have in use.

Second. What roads have adopted your coupler as the standard, or agreed to use it exclusively on their equipment.

Third. Whether you are manufacturers of both couplers and knuckles, or either.

Fourth. If manufacturers, whether you have a regulation M. C. B. drop test in your plant, and what make of pulling testing machine you use.

Fifth. If you have an equipped testing machine, whether you make regular tests and records of each annealing furnace output, or select couplers and knuckles at random from your stock for tests.

Sixth. Whether you have a file record of such tests open to the inspection of your patrons.

Seventh. If you do not make tests as above indicated, how frequently do you have same made by experts, and what records have you open to inspection of patrons.

Eighth. Fully, your guarantee on replacements; if it is time guarantee, state if you are willing to be governed by dates marked on the couplers when applied and removed—under same rules as govern wheel makers who give a mileage guarantee on wheels.

Ninth. If cars are built at works, whether you are willing for time guarantee to begin when same leave factory instead of the date cast on coupler.

Tenth. Price per car.

Eleventh. If a personal representative is sent, please send man who is familiar with mechanical principles, chemical composition and methods of testing iron and steel.

Hydraulic Power for Punches and Shears.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The article on the hydraulic tools and plant in the Romilly shops of the Eastern Railroad of France, which appears in this issue, illustrates the tendency of some writers and investigators to distort facts in order to fit them to previously formed or desirable conclusions. After an excellently clear and complete description of this fine installation of hydraulic machinery, the writer gives a number of reasons why hydraulic power rather than mechanical was selected. The increased safety and convenience of this method of applying power to such tools, are well set forth. Some discussion follows designed to show that there is also great economy in using hydraulic power over what could be obtained with ordinary mechanical connections in such tools as punches and shears on account of their intermittent action

In these calculations it is assumed that all the work done by these tools comes direct from the engines running them, without the intervention of any fly-wheel, because the fly-wheel will only supply energy when the velocity is changed and then but for a short time. Had this reasoning been applied to riveters, flanges and presses, no criticism need be made, as in these tools the power must be strongly applied through a considerable interval and reach its maximum at or near the end of the stroke.

With punches and sheats the action is entirely different, and it is precisely because a slight change in velocity is entirely immaterial and the maximum power is only needed in these machines at intervals and for a short time, that the fly-wheel is such an efficient adjunct and doubtless why it is so generally used on such tools. The largest punch, according to the figures given in the article, consumes about 14,600 ft.-lbs. of work in one second when working to its full capacity, or about 26 h.-p, the 150-ton punch 18.2 h.-p. and the 80-ton punch 9.7 h.-p or about 54 h.-p all together. It would certainly not be difficult to apply fly-wheels to each of these tools that would enable them to be run with the continuous expenditure of but a fraction of this power, and not the whole as is stated. A punch or shear is doing no work except when actually cutting. During at least one-half of the down-stroke and all of the up-stroke almost no work is being done, and the tool is then storing up energy in the fly-wheel so that theoretically it is only necessary to supply a motor generating say one-third of the maximum power needed, or less than 20 h.-p. for the three punches. Of course in the Romilly shops the accumulator is also suppying other tools which are unquestionably better adapted to the use of hydraulic than mechanical power, and the installation as made is probably as economical as it is undoubtedly convenient. Such being the case it is to be regretted that the writer of this article did not cover the entire plant in speaking of its economy and not make erroneous assumptions and draw incorrect conclusions from a part only, which would be very misleading if generally applied. E. M. H.

Improvement of Block Working.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The two collisions mentioned in your record for September, due to errors of block signalmen, suggest one or two thoughts on means of making block working more reliable.

It has been pointed out that the common American telegraph block system is not at all the English block system, as it is often carelessly called; that the English system (aside from the Sykes) includes electric block instruments which provides visible indications of "line clear" and "line blocked" in addition to the information exchanged by means of the electric bells. These indicators steadily exhibit the state of the road after permission has been given for a train to enter the block and while a train is in the block; at any moment information may be obtained from them at a glance. Indeed, they doubtless obtrude the information and may be regarded as a silent and effective protest against errors that the signalman at either end of the block might make through forgetfulness, neglect to record certain movements, or failure to refer to his record before acting.

The usual American arrangement of simple communication by bells or telegraph differs, then, distinctly from the English in the absence of these visual block indicators. But although the employment of such instruments on many American roads now using telegraph block, would undoubtedly increase the efficacy of the block working, the same thing that stands in the way of the controlled manual system would come in here. Many

roads that can gain much in safety by using the telegraph already at hand for block working could not, on account of the cost, provide an equipment of block instruments. In looking, however, for means of bettering the telegraph block, while too much can hardly be said of the need of thorough instruction and careful oversight of signalmen, another important difference between the American and the English should be noted. The difference already noted is one of appliances. But, more than that, the safety of block working in England is greatly enhanced by the use of carefully studied codes of rules and bell signals. Not only do some of the well known lines have such codes, the equal of which would probably be found on few American lines, but already standard codes have been prepared. It may be imagined, however, that block working is a rather simple matter. Apparently a code of signals for communication between towers or stations could be written off in a few minutes. It would be easy enough to set down some numbers to be rung on the bells and to write opposite the number the information it should give; or a few abbreviations or numerical symbols could be provided for the telegraph. And as for rules, the main thing is that a man should not admit a train to the block unless he knows that the block is clear, or until he has got the permission of the next man ahead; a few simple rules and instructions would be sufficient. Easy enough surely. But when it is attempted to carry on block working with strictness and to provide for some of the many contingencies that constantly arise, such as trains crossing over or going into or out of sidings, trains broken in two, trains without markers, trains backing into blocks, trains coupled together, and so on—the simplicity of the work disappears. Indeed, a considerable experience on a road largely equipped with the Sykes system may justify the assertion that both the right arrangement of the bell or telegraph code and the provision of full and clear instructions are highly important.

Although a bell code ought not to be encumbered with unimportant signals, means should be had for transmitting all necessary information, questions and answers. And even where the telegraph is used it is probable that it would be better to have a prescribed code for all the usual communications, than to trust to carelessly worded messages for some of them. Referring to an English code, here are ten signals that tell what kind of a train is coming. The need of so describing trains may not be felt much in this country yet; but it may be a very good thing for a signalman to know what kind of a train is coming; for example, he might with that knowledge, be able to detect a divided train in time to signal the engineman. There is a signal to state that a train is helped by an engine in the rear; probably the intention is to have the signalman on his guard so that he will not deem the block clear unless the engine puts in an appearance. Here is one for a freight train stopping at sidings in the block; and another for a ballast train stopping in the block. Others indicate that a train has no markers, that a train is parted, that a train or cars are running away on the right or on the wrong track, etc. In another code there are special signals for the wrecking train, for which the way must be cleared. A particular chance of error in the use of a bell code lies in the probability that, if a man expects a certain signal he may, through careless counting or from having his attention drawn to another matter at the moment, imagine that the signal *received* is the one *expected*. It is important that the bell signals and answers should be so arranged as to guard against this danger. In some of these English codes the simple answer "yes" is hardly any where prescribed. The understanding of each signal is shown by the repetition of it; and this repetition serves as an affirmative answer when such an answer is suitable. Doubtless the danger referred to was in view when it was provided that, if the line is obstructed a signal for permission to admit a train to the block shall not be answered at all. Silence is a forcible negative; and there is thus no signal to be misunderstood for some other in this critical part of the work.

The standard, or proposed standard, code of regulations for block working in England contains thirty-three rules; but many of these consist of several paragraphs. One rule gives very full instructions as to the conditions under which permission may be given for a train to enter the block; another explains what must be looked out for before a train is reported clear of the block (in foggy weather or falling snow the train must have passed a quarter of a mile beyond the home signal). Others state what is to be done when a train is helped by an engine in the rear; when a ballast train is to stop in the block; when it is necessary to have a train stopped at another tower on account of an obstruction; when a train must be admitted to the block behind a disabled train. Minute instructions are found for the case of a train in dangerous conditions, which should be stopped and examined at the next tower; of a train passing without markers; of a train parted; and of cars running away. Since, in all these cases, the circumstances may lead to the fouling of an adjoining track, it is provided that trains on such tracks must be stopped and warned. This brief mention of the scope of some of the rules may suggest how full and explicit they are, and may show how much of the usefulness is got from the block signal arrangements besides the protection of the rear of each train passing over the road.

The cost may prevent the use of the Sykes system, or even the use of block indicators. Yet, almost without cost, the security and efficiency of the block working on many American roads might be increased by the improvement and enlargement of the codes of rules and signals for communication between the block stations. And these carefully prepared English codes furnish valuable material that could easily be adapted to American needs.

C. C. ANTHONY.

Amber Colored Lights for Distant Signals.

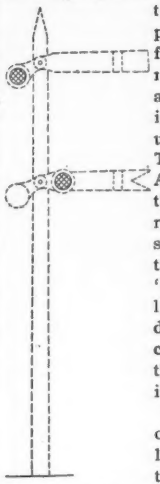
NEW ORLEANS, Nov. 12, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reading your editorial of last week, with reference to the recent report of the American Railway Association, with respect to fixed night signals, I was impressed by the suggestion as regards an amber light for distant signals.

In passing, let me once more call attention to the desirability of describing the distant semaphore in its horizontal position as being a danger signal and not a caution signal. The opinion of the experienced signal officers of my acquaintance is that the only safe reading of a distant signal in the horizontal positon is "Danger! prepare to stop at home signal." The failure to so understand this signal in fast service has led to serious accidents.

Experiments by eminent scientists in connection with signaling at sea, and by signal engineers since the advent of the locomotive, have proved, in my opinion, that only three lights, viz.: white, red and green are sufficiently distinctive where safety is concerned. The problem has been to find a distinct light for the distant danger signal, if we use red for "stop" and green for "all clear at the home." The conditions obtaining in English practice allowed of the use of a red light for the distant signal. The well known conditions prevalent in America will not allow us to overcome the difficulty so easily. The use of a red distant signal light was never very satisfactory in England, when the "distant" occurred on the same post as the "home," and Mr. Henry Johnson published the suggestion in 1881 that a distinction should be made in such cases by placing the "distant" light on the right hand side of the post as shown in the cut.



Now were it not for a pungent sense of inconsistency in the use of a white light as a distant danger signal, when the meaning would be just the reverse with thousands of switch lights and hand signals, I believe a great many of those interested would be in favor of a white light as the distant danger signal, with green as the all clear signal. But it seems to me that as it must always be granted that a large factor of safety depends on the engineman's correct knowledge as to the location of his signals, the only point to be overcome in the adoption of the white and green distant is one of inconsistency.

It therefore appears to me that by the adoption of a white light slightly off color, so to speak, in other words an amber light, we satisfy our consciences about inconsistency, and arrive at a simple solution. Again, by placing the light on the right hand side of the post we gain another very decided distinction when one or more "homes" occur on the same post as the "distant". It may be said that an amber light will appear very much like a white light under certain atmospheric conditions. This would, however, be on the side of safety, with a green light for "clear," for a white light must be regarded as "the absence of a signal where one should be displayed." Allow me to again point out that one of the greatest improvements in night signaling required is the betterment of our signal lamps. The lights are not sufficiently powerful and constant. ARTHUR H. JOHNSON.

[We are glad to see that Mr. Johnson regards the use of amber as a "solution" of this vexed problem, and a simple one. He has had the opportunity to thoroughly digest the lessons of both English and American experience and we have great respect for his opinions. As a mark of this respect we have used the word "distant" in the heading to his letter instead of "caution" as we had it in the editorial to which he refers. But beyond this we think Mr. Johnson's argument is one at which we must rebel. Americans wish to reserve the word "danger" for use at stop signals only. That is the reason why so many men are trying to get some light other than red to put on distant signals. Why is it not just as safe to read "Caution! prepare to stop at the home signal," as to read as Mr. Johnson proposes? For that matter, why not use the last seven words without the exclamatory introduction? We can follow the English fashion and avoid the use of the word "caution" as much as possible, but our practice will remain precisely the same (and the same as the English). Mr. Johnson's view is based on the assumption that "caution" is too mild a term; but in its very mildest form it means "get your speed under control as quickly as possible." What more do we want than that?—EDITOR RAILROAD GAZETTE.]

Sundry Engineering Matters Considered in the Construction and Operation of the New York and Brooklyn Bridge.*

A certain young clergyman, when assigned a text from which to deliver a trial discourse, observed that texts were sometimes useful to indicate what should be avoided in the sermon, and proceeded to take up topics, which in his judgment, were more fitting. The subject assigned for this evening: "Some of the Engineering Problems involved in the Daily Use of the Bridge," will be followed in the same independent spirit; and those matters will be discussed, not necessarily correlated or in sequence, which seem to possess at least a passing interest to the engineers present.

Masonry in the Bridge Structure.—A conspicuous and eminent member of the profession, for years deceased,

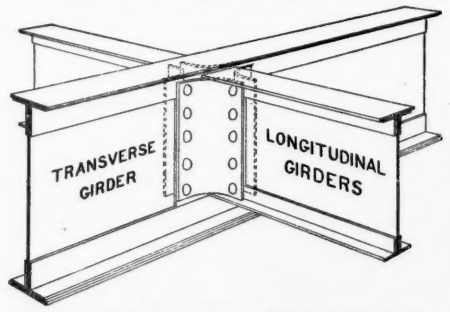


Fig. 3.—Girder Connections—Railroad Platform—Car Storage Yard.

who during a long and varied practice, constructed many important public works, used to remark to young engineers: "You cannot know what is the quality of the masonry you have laid until in after years you have it taken down." Such may reveal to surprised and disappointed constructors, spaces in joints not filled, mortar friable and not coherent, and surfaces detached and unsupporting. The engineer who relies solely upon the accuracy and completeness of his well-considered design, to secure the stability and permanence of the structure he is to erect, errs as greatly, but perhaps in a similar sense, as did at one time an early and conspicuous bridge engineer who had erected on a leading New England railroad several wooden bridges of his own successful design. After some years, he, with the officials of the road, made a tour of inspection, and in the examination of a certain bridge, one of the gentlemen, surprised at finding that he could thrust his steel pointed cane into a decayed principal member of the truss, ejaculated: "Good Heavens, Mr. Howe, what on earth sustains this bridge?" Mr. Howe, gravely, and with deliberation, replied: "The principle, sir, the principle." Design is one thing, material another, and workmanship the third; without these three no structure is durably stable, and of these three elements of construction, perhaps the latter is the more important. "What do you mix your colors with?" inquired a student of an artist famous for the brilliancy and delicacy of his tints. "With brains, chiefly," was the terse reply.

Upon the faithfulness and competence of the workmen

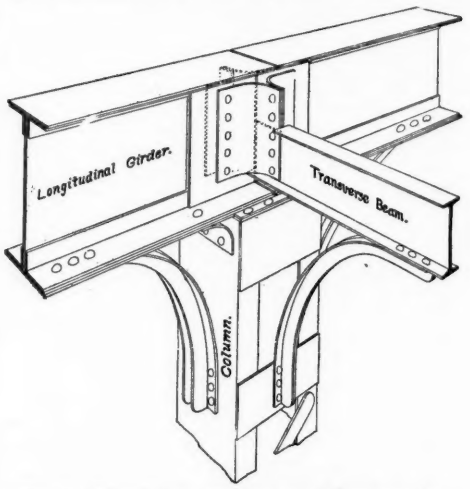


Fig. 4.—Connections—Extension of Roadway in New York.

who execute his design, the engineer must largely rely for the successful accomplishment of his undertaking. That this is true, is being exhibited at the Brooklyn end of the bridge, where, between Sands and Prospect streets, the granite masonry forming the side walls of the approach, is being taken down and erected on new foundations, to permit an increased separation of the roadways at this entrance, rendered necessary by the width of the new station, part of which is to be erected within the included space. In taking the granite blocks down, it was found that the joints were completely filled with mortar when the work was done about thirteen years ago, and could not be parted without risk of fracturing the stones, until the mortar was almost chiseled out. This mortar was uniformly made of Rosendale cement, carefully selected and mixed with two parts of clean, sharp sand. As an object lesson in masonry construction, it

*A lecture delivered Oct. 23, 1894, before the Engineering Section of Brooklyn Institute of Arts and Sciences, by G. Leverich.

will be profitable for young engineers to observe this and similar re-erections.

In these days, when the tendency is to let by contract most public works as well as many private works of magnitude, it may be well to recall, that with the exception of the construction of the caissons underlying the two piers, all of the erection of the structure of the bridge, exclusive of the two terminal stations, up to its completion and opening to public use in 1883, was done by days' work; competent workmen in the several departments being employed, under the constant and efficient supervision of the engineers in charge. This shows, when compared with ordinary contract work, not only a large saving in cost, to be seen by those who, familiar with similar operations, examine the financial records, but more importantly, in the superior quality of the work done. Thus, for simple confirmation, reference is made to the paved roadways of the bridge, the sole avenues for vehicular traffic between two metropolitan cities, each comparatively narrow, and therefore subject to these, the query arises, will not such a metallic floor system rapidly corrode, particularly where on the upper side it is covered with ballast, or on the lower side it is exposed to the gases from locomotives or steam vessels passing underneath the structure, or in localities near the sea where the air is more or less saline? Again, can this corrosion be surely prevented by any paint or covering applied to the metallic surfaces; and may those charged with the care and maintenance of such structure be certain at what rate and to what extent this deterioration is going on?

Attention is called to the flooring underneath the roadways of the New York & Brooklyn Bridge over Prospect street, Brooklyn, and on a grade of 1.6 per cent., a place where the headroom over the street was limited. It consists of a series of parallel, longitudinal brick arches, of 3 ft. 6 in. span, and 3¼ in. rise, laid between 9 in. rolled iron beams. The arches are of a single course of brick 4 in. thick, and backed with concrete 1¾ in. deep at the crown; over this are granite paving blocks 7 in. deep,

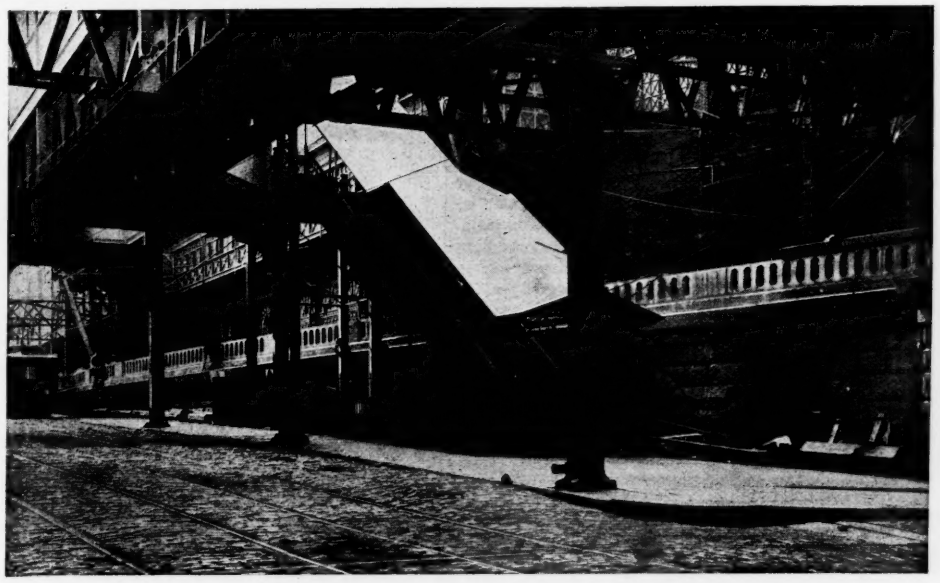


Fig. 1.—Brooklyn Approach—New York & Brooklyn Bridge.

constant wear over their entire surface, sometimes from loads bearing eight tons on a single wheel. These are, without repair, in good condition after thirteen years service, during which time the nearby city streets have been paved twice or thrice, and some of them now need paving again. When the bridge was nearly finished, a contracting engineer, whose completed structures, widely distributed over this country, certified to his qualifications, and who had visited the famous masonry structures in Europe and Egypt, critically inspected the New York approach and pronounced the masonry composing it to be the best he had ever seen. It was new then. The engineer's query is, when judging something about which he is not well informed and which has not been subjected to the test of time, "Will it stand?" An Irishman, vending a compound for preventing rust and decay, said it would last forever; he had tried it twice. After thirteen years, this masonry is as perfect, except in one place where a small crack has developed, as when the masons struck the arch centers and removed the surplus material.

It is now generally forgotten that the artistic design of the exterior faces of the approaches was a subject of close and intelligent consideration; and that the design adopted and wrought out, conformed with the recommendations of a special commission appointed for that pur-

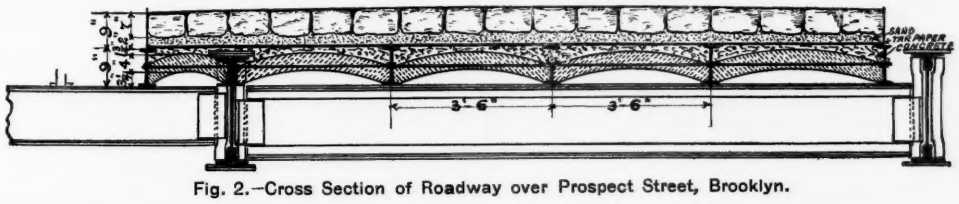


Fig. 2.—Cross Section of Roadway over Prospect Street, Brooklyn.

pose, consisting of Messrs. Wilson, LeBrun and Eidlitz, one civil engineer and two architects, each of high standing in his profession, and not attached to the bridge. The location of the approaches, within two closely built up towns, so that no point of view is possible from which a large part of the masonry structure can be seen, prevents any satisfactory observation of the results of this attempt at artistic effect. Moreover, it is to be regretted that the necessity of providing for increased terminal facilities, recently taken up and now in progress, has caused marked defacement of a portion of the approaches near the two entrances.

Floorway Supports.—It was early recognized by the designers of metallic bridges, that the floorways thereon should be upon supports as enduring and serviceable as the trusses; first, plates of iron or steel, either plane or buckled, were put down over which the paving for a roadway or the ballast for a railroad was laid. Recently, instead of these, various forms of trough plates, with more or less adaptability to the service required, have been used, but without a saving in first cost. Considering upon a layer of clean, coarse sand, about ½ in. thick; the total depth from spring of arches to the upper surface of the paving being about 16½ in.

Vehicles have passed over these roadways continuously since May 24, 1883, often carrying the heaviest loads moved on city streets; and in one case, at least, 20 tons on four wheels, or from six to eight tons on each of the two hind wheels. Since that time no repairs whatever have been necessary, and the underside of the arches now is as clean and free from cracks or leakage as when the masons removed the centers. Similar arches of brick, 8 inches in thickness and generally of 4 ft. span, and 6½ in. rise, were laid on the extension of viaduct for car storage yard, between Concord and Tillary streets over an extent of about 595 ft. long by 100 ft. wide, an area of about 1⅜ acres or 24 regular city lots. These were covered with a backing of concrete, brought to a plane surface, and this coated with asphalt, thus forming a smooth, water tight floor, upon which the rails were laid upon longitudinal wooden stringers, held together by plain plate iron ties.

Effects of Changes in Temperature on Metallic Structures.—In sections, built at different times, the railroad platform, used for switching trains and storage of cars, and located along Washington street, southerly from Sand street, has been extended to Tillary street. The structure is of simple design; lines of transverse girders about 27 ft. apart, each supported on columns, sustain longitudinal girders placed about 4 ft. apart. The material is of iron or steel, the girders generally are of plates and angles, although in one section, the first 20 in. steel I-beams rolled in this country, from the longitudinal members. From Sand to High streets provision was made by interposing slip joints about 50 ft. apart, for expansion and contraction due to changes in atmospheric temperature. It was soon found, when this part of the structure was put in service, that it, though made up of heavy members, would move longitudinally as the trains passed over it; consequently, and also since such permitted a large saving in material, from High to Tillary streets, no slip joints or other similar devices were inserted, and the structure is continuous; the movement due to expansion and contraction being largely concentrated in the angle plate connections, by which the longitudinals are attached to the transverse members. For these connections, carefully selected rolled plates were used, such being bent to shape while hot and with a large curve or fillet between the two legs, resulting in a section permitting quite a change in form without unduly straining the material.

The part of this structure so connected is 1,180 feet long. Careful surveys made at times of comparatively extreme heat and cold, show that it extends two inches under 56 degrees Fahrenheit increase of temperature. For 1,000 feet in length and single thermometer degree—this is 0.04537 inches; were the structures unrestrained and entirely free to move, it should be about 0.08003 inches; hence 0.3466 inches is taken up by the connection plates. Of these, in a single longitudinal line, there are two in about 27 feet; consequently, if this assumption is correct, each will, during a twelve months, and subject to a possible range of 100 degrees temperature, bend in and out about 0.04679 inches, which they will do without observable effect.

To provide for the increased width required for the reconstruction of the New York Station, the roadways were extended out from the spandrels of the masonry of the approach, a space of 13 feet 2 inches for about 440 feet, and of about 20 feet 8 inches for about 90 feet; from thence they were gradually contracted to the width of the old lines. Over North William street and southerly therefrom, these structures consist of a line of longitudinal riveted steel girders, varying in length from 56 ft. 9 in. to 25 ft. 7 in., supported at their ends on steel columns. These girders sustain the outer ends of transverse rolled steel I-beams, the inner ends of which are inserted in the masonry. The beams are from 4 ft. 6 in. to 3 ft. 9 in. apart, and between them are turned 8-inch brick arches, surfaced with concrete, on which the paving is laid. Each line of longitudinal girders is about 550 feet long, and forms in part the outer fender of the roadway; the remainder being of cast iron in suitable lengths. To permit these lines and their attachments to expand and contract under changes of temperature and without disturbing the structure, at each column the ends of the girders were connected to each other and to the columns by means of large, right-angled connection plates; in which the two plane surfaces or legs for the rivets were joined by a circular quadrant of 4 inches radius; neither end of a girder being rigidly attached to the column. With similar purpose, the angle plates between the girders and I-beams over the columns were made with large fillets, and the braces from the columns to the girders are long and curved. By this construction it is intended that whatever change in length in the two lines of girders may result from variations in atmospheric temperature, shall be divided at the several columns and be taken up by these special connections.

(TO BE CONCLUDED.)

The Society of Naval Architects and Marine Engineers.

The second meeting of this society was held in New York at the house of the American Society of Mechanical Engineers last week. This is a new society, having been organized only last year, and its first general meeting was held in New York about a year ago. It is, however, already a society of considerable size and much importance in the quality of its membership. The total membership now is between 470 and 500, and it includes many officers of the navy both in the line and staff, the principal ship builders of the United States, many manufacturers of steel, and other persons whose interests are allied to ship building and marine engineering. The second meeting was very successful in the numbers attending. The papers were of a singularly high order and the discussions were good. The officers of the year before were re-elected and their names will be given at the end of this report as will a list of papers read. The meeting closed Friday evening with a banquet at the Hotel Brunswick.

As would be supposed, when we consider the composition and objects of the society, the meeting was not only scientific, but patriotic, a great deal having been said about the building up of the American naval and mercantile marine. The papers read at the first meeting were published during the year in a valuable volume, and those read at the second meeting, with the discussions, will also be published. Therefore it would be improper, even if we could give the space to it, for us to give either papers or discussions at length, and in the report which follows they will be pretty severely condensed.

The President, Mr. Clement A. Griscom, President of the International Navigation Co., made his opening address very brief in order not to take up the time which was all too short for proper consideration of the great number of long papers. Among other things he spoke of the war between Japan and China as being of surpassing interest to members of the society as well as to all citizens of the Republic. The information now received is not enough to enable one to form any opinion as to the relative advantages of battle ships and cruisers; but the point which impresses Mr. Griscom as being the most important one yet brought out, is the immediate strategical and actual results due to the fact that Japan possessed a large and capable modern fleet thoroughly prepared for actual service, not only with munitions of war but with skilful and well-trained officers and men. These are two great lessons for our countrymen. It should be understood that a modern naval force can not be produced on the spur of the moment, but must be the result of skill which can be obtained only by experience. Further, the full development of a naval force is not possible unless the growth of the merchant marine has kept pace with the naval devel-

opment. In the words of Sir Nathaniel Barnaby "no nation can maintain a sufficient navy without a prosperous commercial marine."

The first paper read was by Rear-Admiral Richard W. Meade, and it was on

RECENT NAVAL CONSTRUCTION AS SEEN THROUGH PROFESSIONAL EXPERIENCE.

Admiral Meade said that as far back as 1863 he had pointed out the folly of building the frames of war vessels of timber instead of iron, but his suggestion was promptly dismissed. Later, when the wooden Trenton was "in frame" and the naval world elsewhere was building with iron or steel, he suggested to a Senate Committee the futility of building or repairing wooden vessels. It is hardly possible now to give an idea of the prejudice of the old navy men in favor of wood. In 1883, however, the Dolphin, Atlanta, Chicago, and Boston appeared as the pioneer ships of the new navy.

The first military need of the country is perfect defense of the coasts, and for this we should have coast defense battle ships, harbor defense armor clads, rams and protected vessels. Admiral Meade would not build a single cruiser beyond those already designed until at least 20 battle ships, 100 torpedo boats and a suitable number of rams were in readiness for active service. Minor sudden emergencies could be met by the purchase of light draught merchant steamers and arming them with rapid fire guns. This would be better and cheaper than keeping large and expensive ships on Southern coasts. Half a dozen good tug boats, with rapid fire guns, would have finished the Bluefields affair long ago.

The naval construction going on is not entirely satisfactory to experienced commanders, and the vessels that seem to be the least satisfactory to the practical men of the profession are the Columbia and Minneapolis, and the Detroit class, and the Cincinnati class to a less degree. The smaller vessels cannot cruise in time of war except in home waters, while the larger ones, like the Columbia, cannot cross the ocean at the speed which the great liners now maintain year in and year out. In fighting qualities he doubts the superiority of the Columbia over the American Liner New York, and in coal capacity the New York and Paris are far superior to the Minneapolis and Columbia. Many thinking men believe that the third screw is a very expensive experiment which we will not be in a hurry to repeat. In fact, high speed commerce destroyers should be bought from the merchant marine. The question of mounting guns and putting in ammunition is one of a few days. Perfect condition of the machinery and hull are more important than the mounting of guns, and it is reasonably certain that the fast merchant steamer, except as to her armament, will be found nearer ready to "sink, burn and destroy" than the very fast man-of-war.

In the construction of the last 10 years there has been a lack of well-defined policy and the designs have been dependent on the whim of individuals and caprice of Congress.

The elements of the great modern navy should be armored ships for coast defense, rams, torpedo vessels, fast cruisers, cruisers of moderate speed, light draught gunboats, store ships, etc. The armored ships for coast defense should be pretty near the Indiana class. For harbor defense there is nothing comparable to the single turret monitor of moderate speed and light draught carrying 12-in. guns. The armored cruisers are well covered in the original design of the New York. Of rams it is too soon to say very much. Of torpedo boats we should have a class larger than the Cushion and the Ericsson.

One great advantage in having a considerable number of torpedo boats is the training in command that it would give to the younger officers. For fast cruisers there is nothing better than the Lucania and Campania, and in a less degree the New York, Paris, Majestic, etc. But these should belong to the merchant marine, and Congress should hold out the greatest inducements to American builders and ship owners to maintain such ships on the ocean. In 48 hours these could be armed and receive their war stores.

Admiral Meade closed with a statement of the broad proposition of the necessity of building up again the American merchant marine and with the suggestion that our navy should return to the use of anthracite coal for strategic reasons. He, as an old blockader, remembers well what black smoke means.

This paper was followed by a spirited discussion and a short abstract follows:

DISCUSSION OF ADMIRAL MEADE'S PAPER.

CAPTAIN BARBOUR, U. S. N.: Admiral Meade's paper is exceedingly well put, but the practice that he would have is impossible in our country. If we could have 300 ships we could indulge every man's fancy for variety.

From the recent battle of the Yalu River I could make an argument on either side as to whether we should build battle ships or unarmored cruisers, but it would not be fair to draw any conclusions. I am strongly inclined to think that the three largest vessels of the Japanese fleet were packed with cellulose, and that this had a considerable bearing on the result.

MR. FRANCIS T. BOWLES, Constructor, U. S. N.: I regret that Admiral Meade should have seen fit to try to revive an old idea that efficient naval vessels can be made from tugs. That idea has worried us more than anything else we have had to deal with. Further, the idea that a merchant ship can be changed into a cruiser in 48 hours is wrong. The comparison of the new American cruisers with the Lucania and Campania is misleading. We require something else in our cruisers than the ability to cross the ocean at full speed. The Columbia and the Minneapolis have complete protective decks and water tight sub-divisions, and are practically safe from assaults by small guns, whereas a large merchant vessel could be destroyed by one well-placed shot.

MR. JOHN C. KAFER: Mr. Kafer was asked in what time he could fit out the vessels purchased for Brazil. He replied that with full authority he could do it in 20 days; in fact he worked night and day and did it in 15. The greatest time was taken in the arrangement of the batteries. To change a merchant vessel into a naval vessel in two days would be an impossibility.

There is no doubt that the merchant marine must be the backbone of the navy, although merchant vessels could not be as efficient as the Columbia. El Sol was an excellent ship for conversion—better than the Lucania and Campania. She was well arranged for placing the guns, had a good metacentric height, so that with all her coal out and two torpedo boats on the upper deck she would still be stable; not being very long she is handy.

In developing the Merchant Marine the vessels that are built must be so built as to pay commercially, which means that the machinery must be put in the most advantageous position for propulsion and for carrying cargo. The great transatlantic liners will be much restricted in usefulness by the fact that they cannot enter more than one or two ports along the Atlantic Coast; but we have vessels cruising aloug our coast that would be very efficient in war; the vessels of the Morgan Line, the Cromwell Line and the Old Dominion Steamship Company. They could be easily converted, would make a good fight and if one was lost the loss would not be heavy.

In building up the merchant marine it must be remembered that men are not going to put their money into ships unless they will pay. There is not a steamship line running out of New York to-day that pays dividends. To build up our merchant marine the United States Government must help; the only hope is to have Congress appropriate sufficient money to aid in the building of vessels that could be put at the disposal of the Government in time of war.

CHIEF ENGINEER MELVILLE, U. S. N.: Nobody will deny that the Minneapolis would be a better ship for us if she carried as much coal as the Campania, but this is a physical impossibility. The Campania burns over 600 tons a day and must carry at least 4,000 tons of coal. If the Minneapolis carried as much as this the coal and machinery would take up about 80 per cent. of her displacement, leaving less than 1,500 tons for hull, battery and equipment The Campania's machinery and coal require as much displacement as the total of the Minneapolis. If it were possible to build a vessel with the displacement of the Minneapolis to cross the Atlantic at the speed of the Campania it is safe to say that the owners of the transatlantic liners would not be building vessels twice as big to do the work. If you want high speed and great endurance you must build big ships.

MR. J. W. MILLER, President Providence & Stonington Steamship Company: If we build a war ship we are simply building a consumer; if we build a merchant ship we are building a producer, and building up the wealth of the country and its marine influence. The efforts of the country should be expended in building up protected ships and ships for the defense of the coasts and in developing the merchant marine, and this must be done first. Thus we are not only adding to the wealth of the nation, but we are educating, on the merchant vessels, men for the navy who would be most valuable in time of war.

MR. WALTER MCFARLAND, Passed Assistant Engineer, U. S. N.: In the paper of the Engineer-in-Chief, which will be read later, it is demonstrated clearly that the third screw instead of being an expensive experiment is actually economical. With triple screw ships there is an economy of from 10 to 20 per cent. in coal consumption; that is, when we compare performances at something near the full power of the respective vessels. The same point was made by Mr. Edwin S. Cramp in further discussion.

MR. THEODORE D. WILSON, Ex Chief Constructor, U. S. N.: Admiral Meade says that it is hardly possible to convey an idea of the intense prejudice on the part of the majority of the navy men in favor of wood as against iron, and because of this it was not until 1883 that anything could be done in the way of progress. It is a fact that there are now in this room at least five of the old constructors of the navy who in 1873 sent to the Navy Department plans for cruising ships of 3,700 tons displacement capable of 16 knots, to be built just as ships should be built to-day. These men were in favor of iron ships. In 1881 the present Chief Constructor of the Navy and Mr. Wilson, ex-Engineer-in-Chief Loring and Mr. Kafer were members of the First Naval Advisory Board. Every ship recommended by that board was of steel. A minority report was made in favor of iron because there was doubt as to the possibility of producing the necessary steel in America. This should dispose of the statement that the old constructors were opposed to iron ships. In 1870 our rolling mills could not have supplied material for ships of the Trenton class. In fact a 12-inch beam could not be made in Europe then except by rolling the two flanges and welding them together on the neutral axis of the beam.

The second paper was by Monsieur E. Bertin, Director of the French Government School of Naval Design, on "The Use of Small Models for the Determination of Curves of Stability." The scope of this paper is sufficiently indicated by its title. It describes methods and results which M. Bertin has used, giving a historical development of the subject. The discussion was short. The next paper was by Mr. George W. Dickie, Manager Union Iron Works, on

"SOME OBSTACLES TO SHIP BUILDING AND OWNING IN THIS COUNTRY."

He lays down as the fundamental conditions of the rebuilding of the American merchant marine: a patriotic ambition to carry our commerce under our own flag; wise national laws to protect and foster the marine; state and municipal laws encouraging ship building and ship owning. The Congressional acts designed to restore these great industries appear to have failed in accomplishing satisfactory results. Many claim that American ships, built of protected material and with protected labor, represent too large a capital to compete with foreign vessels, and this idea, although often condemned as unpatriotic, is business truth. We must either build ships as cheaply as other people or give the ship owner the privilege of buying his ships abroad. But the free purchase of ships would be as unjust under the protectionist idea as the free purchase of engines, and it follows that if we want to restore our ocean commerce the public purse must be opened to place the ship owner on an equal footing with the foreign competitor. Therefore Congress should see to it that no merchant shipping act of Parliament places the British ship owner in such a favorable position but that a merchant shipping act of our Congress will do a little better for the American ship owner.

There is a great opportunity for the establishment of an American steamship line between San Francisco and New York, taking in the principal seaports of South America. A business could be built up there for two steamers a month, having a general freight capacity of 6,000 tons each, with accommodations for a limited number of cabin passengers between way ports.

Many people consider it the duty of the Government to help build an Isthmian canal, but where are the United States fleets that are to benefit by such a waterway? Let us have the canal; but while this work is hatching, let us bring into existence the ships and the trade.

State and municipal legislation is also needed. For instance, the constitution of the State of California provides that all property found within the state on a certain day each year, whether real or personal, must be taxed on its value at the time. The evidence of the ownership of ship property being found in the Custom House, it is taxed. A vessel owned and registered in San Francisco has to pay the same city, county and state tax as a building in the State valued at the same amount. The load is crushing and the injustice is manifest, for the vessel receives practically no benefit from the expenditure of the taxes. On the contrary, she still has to pay wharf dues at the same rate as a foreign vessel while lying at the wharf.

DISCUSSION OF MR. DICKIE'S PAPER.

MR. F. B. KING, Maryland Steel Company: I wish that Mr. Dickie had given us his views about the cost of American ship building as compared with English. I am confident that the gap between the cost there and here is not impassable. The greater cost in America is not due so much to the price of material or the higher price of labor as to the fact that ship building in our yards is so spasmodic; that is, the necessary fixed expenses cannot be distributed over a large enough and steady enough volume of product. Further, the universal practice of piece work in the English ship yards is a great economy there, but that is only possible where work is steady.

MR. EDWIN S. CRAMP.: The trouble is not so much in the first cost of the ship as in the fact that when the American owner has a ship built you make him pay double for running the ship. If the American system of protection is a good thing, and if the working people want it and must have it, then ship owners also must be protected by mail subsidy, bounty, naval reserve or whatever you choose to call it. When you take care of the ship owner you take care of the ship builder, and when the ship builder has plenty of work the question of piece work will be solved.

ELECTRICITY ON SHIPBOARD.

Mr. S. Dana Greene, late Ensign of the United States Navy, read a paper on this subject, So far, the principle, and indeed almost the sole application of electricity on shipboard, has been for lighting. In this direction the American practice has developed apparatus in most respects superior to that in use in other navies, but it deteriorates more rapidly because our people have paid less attention to strength and durability. In fact, electrical installations at sea are subject to special agencies of destruction, as salt water, salt air, steam and excessive heat, and Mr. Greene thinks that a marine installation should be expected to cost at least double what it would cost on shore. The wiring of a ship is the most difficult and expensive part of the whole installation.

The applications to be made in future on warships, include the operation of ammunition hoists, the turrets and the heavy guns, the torpedo apparatus, the ventilators, portable machinery of various sorts, the operating valve of the steam steering engine, the opening and closing of water tight doors, and the driving of ice machines. Beyond this a special application will be in the range finder, which will play an important part in determining a victory. Signaling and firing circuits and electric logs will also be used. A curious special application has been

devised by Lieutenant Bersier, of the French Navy; this is in automatic steering. By an ingenious arrangement the movements of the rudder are governed automatically by the movements of the compass gear, so that the ship is held on her course without the constant use of the wheel by the helmsman. This device has been tested in squadron practice for two months with complete success.

DISCUSSION OF MR. GREENE'S PAPER.

MR. J. W. MILLER: We have used search lights on our sound steamers with great effect. That use was developed on the idea that the ship should not have a search light in order to see during a fog, but in order that other ships could see it. Then the idea came that the light should be aided by sound and we looked about for a device that would sound an automatic whistle. In the last few months the inventors have, I think, succeeded in getting over their troubles and now we haev on our steamers an electric device which sounds the whistle automatically at required intervals. Intervals for different ships are different so as to convey specific information. Such a device would be of great use in men of war. The vessels of the squadron could have their whistles timed to sound at characteristic intervals.

HYDRAULIC POWER FOR WARSHIPS.

Mr. Albert W. Stahl, Naval Constructor, United States Navy, read an important, paper on this subject. The distribution of steam power for auxiliary purposes is objectionable on shipboard and especially on warships where the pipes are liable to serious injury in action. Moreover, skilled labor is required in keeping the auxiliary engines in order and to attend them in operation. Then the necessity of warming and draining the engines and their piping before they can be safely run is especially objectionable in uses where the action requires short intervals of motion with greater or less intervals of rest. Compressed air would have certain advantages, but air engines are practically as complex as steam engines. The substitution of hydraulic power would decrease the total weight of machinery; cold water pipes would take the place of hot steam pipes, the motors would be simpler and the repairs to pipes injured in action would be easier. In the proposed applications of hydraulic power, all gearing to get higher or lower speeds than that of the motor, should be dispensed with, and the water pressure to be used should be the same for all the various motors. In the general scheme, therefore, there would be one central pumping plant, delivering the necessary water at a uniform pressure to all the motors. The author advocates the general adoption of hydraulic power for all auxiliary machinery outside the engine and boiler rooms.

Mr. Stahl would install for the pumping plant triple-expansion steam engines, and probably use duplicate plants, each competent to do half the total maximum work. The fluid for transmission of power should be distilled water, which would be the more convenient as danger of freezing is not present.

In the choice of accumulators Mr. Greene thinks that on the whole the pneumatic accumulator would be the best type for ship use, needing less attention than any other kind; and he shows such an accumulator fitted on the Monterey in connection with the hydraulic turning gear for the turret. This accumulator has given very satisfactory results and seems to be a good arrangement where the volume of accumulated water is not very large. Another design, as used on the Oregon, also for turning turrets, shows an accumulator of greater capacity. The water pressure in this case is 600 lbs. to the square inch, and the air pressure 150 lbs.; but neither of these types is exactly suited to the general hydraulic system proposed. It would seem best to make the main air chamber a separate vessel built of steel boiler-plate, connecting at the top by a large pipe to a small air chamber similar to that of the Oregon. Keeping in mind the principle that the normal speed of the motors should be equal to that of the machines, so as to avoid intermediate gearing, Mr. Stahl classifies the various operations in accordance with the three types of motors: direct acting hydraulic cylinders for operations requiring motion in straight lines, or limited motion in a circular direction, such as steering gear, turret gun machinery, ammunition hoists, etc.; hydraulic engines for operations requiring reversible circular motion with great power and moderate speed, as the larger turrets, windlasses, capstans and winches; tangential water wheels for operations requiring high speed, moderate power, continuous and usually non reversible circular motion, including dynamos, ventilating fans and blowers. The paper then goes on to describe at some length the steering gear of four vessels built for the United States Navy by the Union Iron Works of San Francisco, in which the apparatus has developed such simplicity, strength, ease of manipulation and reliability as to justify the opinion that a similar type of machinery should be used in future designs for the navy. By means of a differential controlling gear the rudder moves as the steering wheel moves, and stops as the wheel stops, the action of the rudder being very little later than that of the wheel; and the beauty of conception, rapidity and accuracy of action in this differential gear leaves little to be desired. As to the weight, Mr. Stahl has compared the hydraulic steering gear of the Oregon with the steam steering gear of the Indiana and finds that the steam gear is actually heavier.

In the Monterey the guns are elevated and depressed and run in and out, their ammunition is hoisted and the guns are loaded by direct acting hydraulic cylinders. On the Olympia the 10 5-in. guns on the main deck are supplied with ammuntion by 12 hoisting chutes, in which work endless chains actuated by electric motors. While the presence of an electric motor is not as objectionable in the ammunition passing room as that of a steam engine, yet a properly designed hydraulic gear is simpler, more reliable and certain to work well in non-skilled hands and in the excitement of battle. The hydraulic engines used for revolving the large turrets of the Monterey and Oregon are described.

Probably the most novel suggestion of the paper is the application of the Pelton water-wheel for the third class of operations; that is, for high speed, moderate power and more or less continuous operation in one direction. It is suggested that such wheels be used for the motors of the dynamos for lighting. A sensitive and quick-acting governor is necessary for such an application and one that works successfully is described. This is used in several large electric lighting plants in California where the dynamos are driven by the tangential wheels. The same use of hydraulic power could be made for blowers and another application would be for driving the tools in the machine shop on shipboard. Mr. George W. Dickie, Manager of the Union Iron Works of San Francisco, is probably the first to suggest the use of this water wheel on naval vessels.

DISCUSSION OF MR. STAHL'S PAPERS.

MR. JOSEPH H. LINNARD, Naval Constructor, U. S. N.: Mr. Stahl mentions the objection to hydraulic power that hydraulic engines consume the same quantity of water at the same pressure whether the load is the maximum or not. Even under present circumstances the amount of steam used for auxiliary purposes in a war ship is very great. In action, at the very moment when we want our maximum power on our main engines, we are liable to use the greater part of our auxiliaries, and therefore the economy of steam must be seriously studied; but the more transformations we have the less the efficiency. Steam or pneumatic power when using a light load can be economized. In steering, for instance, the first few degrees turned by the rudder require very little power. In the maximum turn the power is multiplied enormously. With a hydraulic steering gear we must have as much power and use as much steam at small inclinations as at the maximum. Small angles in steering are used constantly, but with the hydraulic engine they are using the maximum steam all the time.

MR. EDWIN S. CRAMP: Mr. Stahl's beautiful picture of success with hydraulic installations and his picture of the difficulties with bursting steam pipes is interesting, but misleading. In vessels in which steam gear has been installed, bursting steam pipes are very infrequent, but the pipes in vessels fitted with hydraulic gear are an unceasing trouble. The expense of hydraulic hoisting gear has condemned its use in this country. There are four or five reasons why hydraulic gear is not good. Its first cost is greater, its weight is greater, the repairs are serious, it is liable to break down, particularly in cold climates, and it is the most expensive way in which power can be transmitted.

MR. W. C. WILLIAMSON: The matter of designing hydraulic steering gear for the Indiana and Massachusetts was put in my hands by Messrs. Cramp. I found by calculation that it would weigh fully 40 per cent. more than steam, but I did not include the hydraulic pumps or accumulator. Mr. Stahl says that the skilled labor required would be less. This I think is a mistake, judging from what I have seen of the hydraulic machinery on the Paris and the New York. On those ships they have a hydraulic engineer to look especially after the pumps and plant and this installation requires an extra man on each watch. The hydraulic hoisting machinery of the New York was replaced by steam winches about a year ago and the same change will soon be made on the Paris. Another difficulty is that you cannot steer as fine with the hydraulic gear as with steam. Every inch of movement of the ram shows in the movement of the tiller, but with the steam gear you get some elasticity. Some years ago hydraulic stearing gear was put in the Old Dominion Steamer Senaca, but the ship made such a zig-zag course that the result was perceptible in the amount of coal burned. This was replaced by a steam steering gear We took the hydraulic steering gear out of the Decatur S. Miller, of the Merchants & Miners Steamship Company, and put in a steam steering gear for the same reason. I believe there is only one steamboat now coming into the port of New York with hydraulic steam gear. Mr. Williamson also pointed out an error in Mr. Stahl's weights of the Indiana's steering gear

While I am ready to build hydraulic steering gear actual experience and facts demonstrate that the steam is preferable. We might eventually save piping for auxiliary gear by using electricity instead of steam. We now have a contract for electric ash hoists for the St. Louis and the St. Paul.

MR. STAHL: I do not think the assertion will hold water that the hydraulic gear is heavier than that for steam. The lack of economy I admit, but this is a small matter. I am talking about war ships and not about merchant vessels, and this covers also the difficulties raised about the freezing of water in the pipes. You can use glycerine or mineral oil; but on a war vessel you would not have the power pipes exposed to the weather. As to the bursting of pipes the reference was to pipes perforated by shot in which case there could be no question of the immense advantage of having those pipes filled with water instead of steam. As for the rank steering with hydraulic gear, hydraulic apparatus of great delicacy and accuracy is designed. Probably there is not a ship afloat that can compare in these qualities with the Olympia. I haev that on the report of the trial board and from personal conversation with officers. As for the increase of coal consumption by bad steering, why when they get men who steer like that they had better take the men out of the ship and not the steering gear.

MR. WILLIAMSON: We have recently put an electric attachment on the Freisland for workintg the steering gear. Five or six round trips have been made and the apparatus has never failed. The captain says he can make better time with the electric steering gear than he could before with the hand gear.

Further abstracts of papers and discussions will be given in a later issue.

PAPERS READ AT THE MEETING OF THE SOCIETY OF NAVAL ARCHITECTS

Some Suggestions of Professional Experience in Connection with the Naval Construction of the last ten years—1884-1894. Richard W. Meade, Rear Admiral U. S. Navy.

The Use of Small Models for the Determination of Curves of Stability. Mon. E. Bertin, Director, French Government School of Naval Design.

Some Obstacles to Shipbuilding and Owning in this Country, G. W. Dickie, Esq., Naval Architect, San Francisco, Cal.

Present Status of Face Hardened Armor, W. T. Sampson, Captain and Chief of Ordinance, U. S. Navy.

Cellulose and its Application to Warships, Mon. E. Cheneau, Philadelphia, Pa.

Experience Gained with our New Steel Ships as Regards Care and Preservation, Philip Hichborn, Chief Constructor, U. S. Navy.

The U. S. Triple-screw Cruisers "Columbia" and "Minneapolis," George W. Melville, Engineer-in-Chief, U. S. Navy.

Electricity on Shipboard—Its Present Position and Future Development, S. Dana Greene, Esq., New York, N. Y.

Hydraulic Power for Warships, Albert W. Stahl, Naval Constructor, U. S Navy.

Yachts in England and America, Lewis Nixon, Esq., Naval Architect, Philadelphia, Pa.

A Dynamic Steam Engine Indicator Tester, Professor Cecil H. Peabody and Ass't Professor E. F. Miller, Massachusetts Institute of Technology.

Notes on Launching, William J. Baxter, Naval Constructor, U. S. Navy.

Accessibility and Circulation of Water Tube Boilers, L. D. Davis, Esq., M. E., Erie, Pa.

Recent Light-draught Gunboats of the U. S. Navy, J. J. Woodward, Naval Constructor, U. S. Navy.

OFFICERS ELECTED AT THE NEW YORK MEETING.

President, Clement A. Griscom, Esq.

First Vice-President, Theodore D. Wilson, U. S. N.

Vice-Presidents, Charles H. Cramp, Esq., Philip Hichborn, U. S. N., Chas. H. Loring, U. S. N. (retired), Richard W. Meade, U. S. N., George W. Melville, U. S. N., George W. Quintard, Esq., Irving M. Scott, Esq., Francis A. Walker, Esq., Wm. H. Webb, Esq.

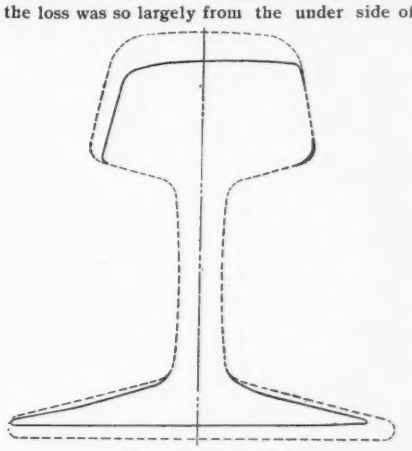
Members and Associate Members of Council, Francis T. Bowles, U. S. N., French E. Chadwick, U. S. N., Frank L. Fernald, U. S. N., H. Taylor Gause., Esq., Nathaniel G. Herreshoff, Esq., Thomas W. Hyde, Esq., William H. Jaques, Esq., John C. Kafer, U. S. N. (retired), Frank B. King, Esq., Frank E. Kirby, Esq., Jacob W. Miller, Esq., Lewis Nixon, Esq., Calvin B. Orcutt, Esq., John F. Pankhurst, Esq., Harrington Putnam, Esq., William T. Sampson, U. S. N., Horace See, Esq., Edwin A. Stevens, Esq., E. Platt Stratton, Esq., Stevenson Taylor, Esq., George E. Weed, Esq., Frank W. Wheeler, Esq.

Executive Committee.—Francis T. Bowles, U. S. N., Chairman, Washington L. Capps, U. S. N., ex-officio, H. Taylor Gause, Esq., Clement A. Griscom, Esq., ex-officio, Lewis Nixon, Esq., Harrington Putnam, Esq., Edwin A. Stevens, Esq.

Secretary and Treasurer, Washington L. Capps, U. S. N.

Corrosion of Rails in Tunnels.

The two sections which are shown herewith are from a 76-lb. steel rail on the Lehigh Valley Railroad. The section shown in dotted lines is the original form of the rail; the full lines show the loss of material by corrosion. The sections have been reduced exactly one-half in the engraving. This corroded section is from a rail taken from the west bound track in Musconetcong tunnel. The rail had been in the track five years. It will be observed that much the greatest loss by corrosion is in the bottom flange; the loss from the top and running side of the head is of course from wear. It seems a curious circumstance that the loss was so largely from the under side of the



Corrosion of a Rail.

flange. There is little diminution of the thickness of the web, and the under side of the head seems to have lost very little.

From E. J. Dorsey, Supervisor, we have ascertained that there can be no question about the two sections having originally been alike. The worn section was cut from the rail where it rested on a tie plate, but the same results are shown where the rail was on the tie itself. The roadbed is practically solid rock bottom, and it is impossible to change the surface on account of the limited space. The track has therefore little or no elasticity. The tunnel is very wet and the rails slippery and a good deal of sand must be used. This collects along the rail and works underneath the base, adding, no doubt, to the wear by friction between the rail and the tie or tie plate. This influence, acting with the corrosion caused by the gases, wears the rails out very fast.

Hydraulic Tools and Plant in French Car Shops.

There appeared a few months ago in the *Revue Générale des Chemins des Fer* an interesting article by Louis Tolmer of the Romilly shops of the Eastern Railroad, covering the reasons for using hydraulic power in their shops for riveters, punches, flangers, shears, lifts and other machines to which power is applied intermittingly, as well as a description of the various machine tools so equipped and the economy resulting from doing work in this way, which was formerly done by hand or by ordinary machine tools. The Romilly Car Shops were designed to build upward of 500 cars per year, and as the use of hydraulic power for riveting had proved so successful in bridge, boiler and ship building, it was decided to employ it here also, as the entire underframing of the cars now built is of iron beams and plates united by rivets, necessitating driving 500 rivets in each frame or 250,000 rivets per year for the frames alone. In addition, the riveting of tires upon wheel centers was to be provided for as well as a certain excess over present needs to cover future growth and development. This riveting plant necessitated the installation of hydraulic pumps and accumulators, which could also be used for other hydraulic machine tools designed to replace the ordinary mechanical operated punches, shears, etc. A plan of this shop and location of these tools is shown in Fig. 1, and includes the following:

Hydraulic pumps H, for charging the accumulators. An accumulator G containing water under 1,420 lbs. per square in. pressure. A double system of hydraulic piping from pumps to accumulator, from accumulator to hydraulic tools, and from tools back to the pumps, so arranged that in case of the failure of one system the other can be immediately substituted. Two portable 20-ton hydraulic riveters A A, with horizontal plungers for riveting car frames, each mounted on a walking crane, furnished with a hydraulic lift. One portable 20-ton hydraulic riveter B, also with horizontal plunger for riveting car frames and mounted on a walking crane with hydraulic lift. This riveter can also be used as a punch. One 23-ton hydraulic riveter C, in the wheel shop for riveting tires. One 15-ton hydraulic flanger D, with vertical plunger. One 45-ton hydraulic press E, for bending and straightening sills. Three convertable shears or punches F_1, F_2, F_3, of 220, 150 and 80-ton capacity.

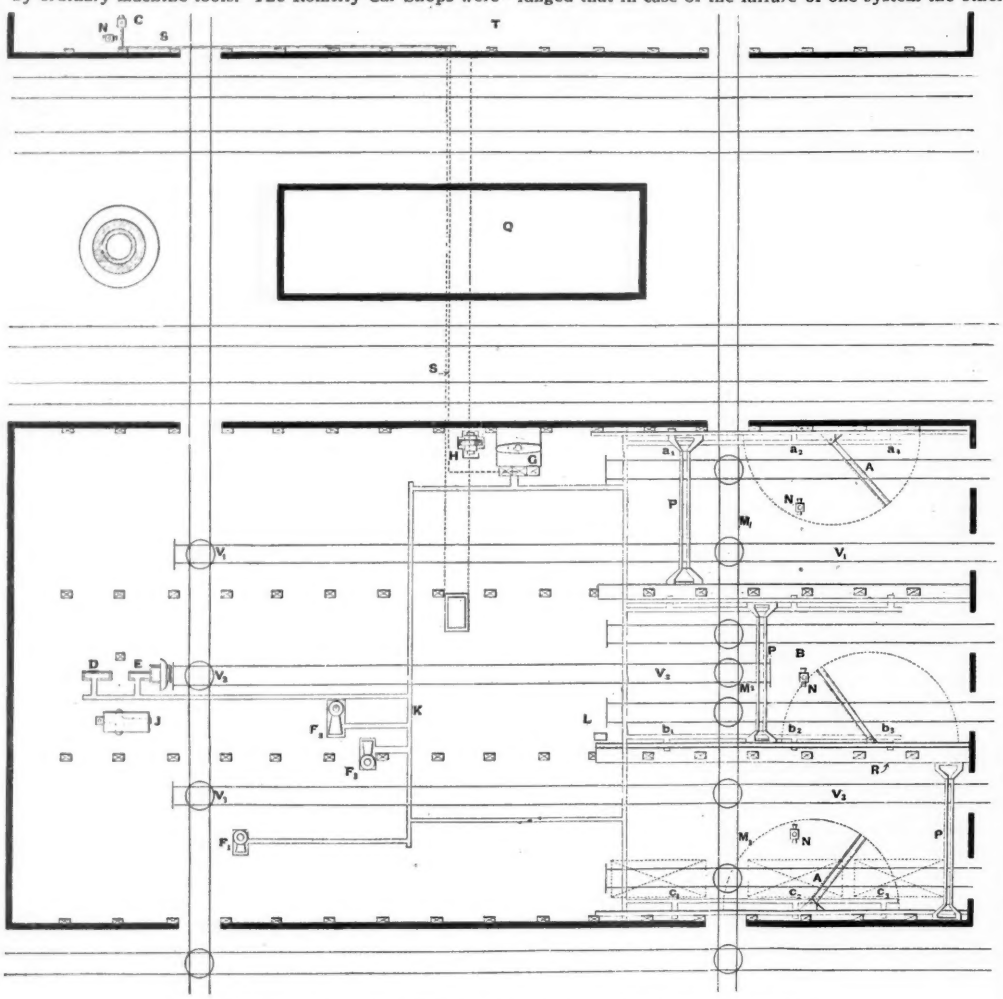


Fig. 1.—General Plan with Location of Hydraulic Tools, Romilly Car Shops.

J.—Flanging and reheating furnace.
L.—20 ton riveter used as a punch.
N.—Gas rivet furnace.
P.—Crane, 6,000 lbs.
Q.—Engine and boiler.
R.—Track for crane.
S.—Pipe from accumulator to riveter.
T.—Tire setting shop.

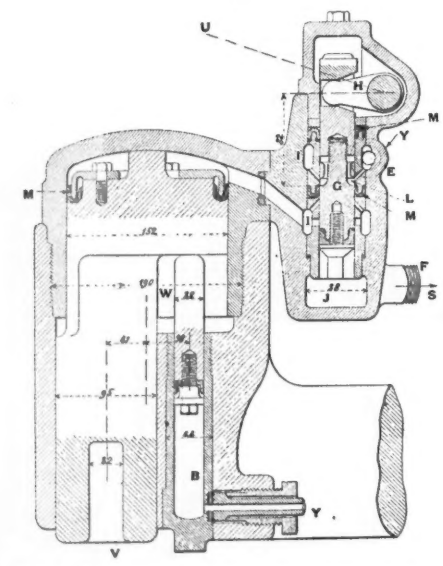


Fig. 2—Section of Operating Valve and Cylinder.

S.—Exhaust connection for return pipe.
U.—Operating lever.
V.—Socket for riveter die.
W.—Returning piston.
X.—Water connection for returning piston.

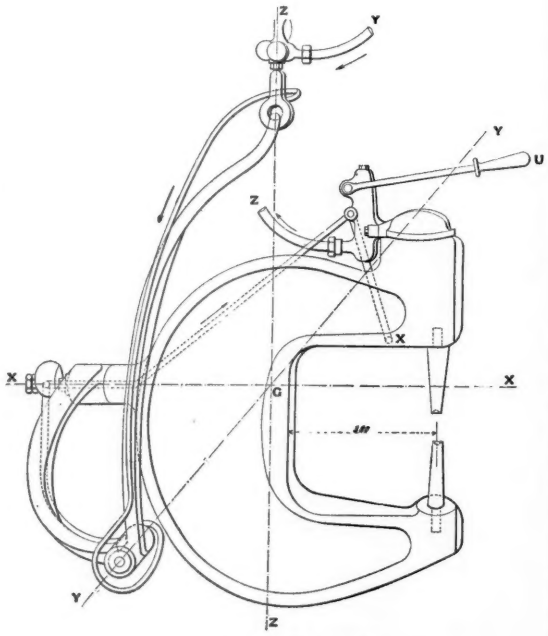


Fig. 3.—Perspective.

Y.—Pipe from accumulator.
Z.—Exhaust return pipe.

The reasons why hydraulic power was decided upon, were first, on account of the greater personal safety of the workmen in the shop; second, the better character of the work and economy due to improved methods of handling and doing work made possible by its use. Third, economy in the engine and boiler installation, and consequent fuel consumption due to substituting hydraulic for mechanical power in a certain class of machine tools, in which power is not required continuously.

The diminution of the chances for personal injury is evident when one considers that in a shop provided throughout with hydraulic power, all shafting, pulleys, belting, etc., are done away with, cranes, lifts, etc., can be placed wherever required, and both workmen and material can move about the machinery with greater ease and safety.

The kind of work to be done by machinery, such as is there installed, is very different, and consequently to produce perfect results, the manner of applying the power should be susceptible of easy and wide variation. The shears, punches and flangers, must move slowly, regularly, and powerfully, the bending machines must not only move slowly, regularly, and with great power, but must also be easily stopped at any part of their stroke. For riveting machines, a powerful unresisting pressure must be had at the end of the stroke. All these results are readily obtained with hydraulic power by the proper design of admission and release valves. In riveting car frames at these shops it was found that rivets nearly one-eighth inch longer were required when hydraulic power was used than when riveting by hand, showing clearly that the machine riveting filled the holes much better than that done by hand. Bad work in punching is avoided by the ease with which the punch can be stopped at any point of the stroke, while the great power available enables multiple punches to be used, adding greater accuracy and interchangeability to the economy of the work so performed.

Economy in the power plant is possible with the use of hydraulic power in machinery, such as is described above, on account of the essential difference between the action of riveters, punches, shears, flangers, etc., and that of such machines as lathes, drill presses and planers, to which power must be supplied continuously. If flangers, punches, shears, etc., were operated mechanically and without a fly-wheel the energy must, of course, come direct from the generator. The fly-wheel will, however, only supply energy when the velocity is changed, and then only for a short time. If the excess continues, it still becomes necessary to draw direct from the generator and increase its size and capacity. With hydraulic power the accumulator to the extent of its capacity supplies full and constant power. Take for example the three punches and shears of these shops exerting a force of 80, 150 and 220 tons respectively, a total of 450 tons. Assume all three acting at the same time upon a sheet of 0.4 inches in thickness. The work done is $900{,}000 \times \frac{.4}{12} = 30{,}000$ ft.-pounds. This work must come directly from the boilers if the machine tools are operated mechanically, but from the accumulators if by hydraulic power. If the operation continues during one second of time in the first case, it will require .231 lbs. of steam, since the Corliss engines used at the Romilly shops consume 15.28 lbs. of steam per horse-power hour, equal to 0.0000077 lbs. per ft.-pound, or 0.231 lbs. for 30,000 ft. lbs. In the second case, with the accumulator containing 24,400 cu. inches of water, under a pressure of 1,420 lbs. per sq. inch, or 2,886,400 ft.-lbs. of stored energy, there is only required of the boiler steam enough to replace the 30,000 ft.-lbs. of energy used at the usual rate of working the compressing pumps. These put 24,400 cu. inches of water into the accumulator in 4½ minutes, exerting therefore 19 to 20 horse-power. Experience shows this is sufficient in the shops at Romilly to keep the accumulator supplied, therefore the steam required at any time does not exceed $(20 \times 550) \times 0.0000077 = .0847$ lbs. per second. We thus see that the size of the generators can be reduced where accumulators are employed, and must therefore conclude that the employment of hydraulic power to operate machine tools used at intervals enables smaller engines and boilers to be used than if these tools are mechanically driven.

The hydraulic appliances used may be divided into two classes, one in which the power moves the plunger in one direction only, gravity returning it, the other in which the plunger is moved by water pressure in both directions. The former is only represented by the hydraulic lifts, all other tools belonging to the latter class.

The alternating motion of the plunger is generally obtained by means of a small additional piston working in the opposite direction and against the large working plunger. The full water pressure is constantly against the small piston, so that the effective or working area of the tool is, therefore, the difference between the areas of the two pistons. One form of this arrangement is shown in Fig. 2.

The hydraulic valve is simple, and is shown in section in fig. 4. H is the operating lever controlling both admission and exhaust valves D and C. E is the pipe leading to the accumulator, and F the opening into the cylinder. The pipe E^1 is the return for the water discharged through the valve C after work is performed. All parts are so clearly shown in the drawing as to need no further explanation.

Where a more compact form of valve is desirable that shown in section in figs. 2 and 5 is used. Here the

water from the accumulator enters the valve at E, and passes by ports I and L into the cylinder. The exhaust passes to the return pipes through port J. The valves in both figures are shown in an intermediate position, permitting water neither to enter nor escape from the working cylinder. In fig. 2, depressing the valve puts

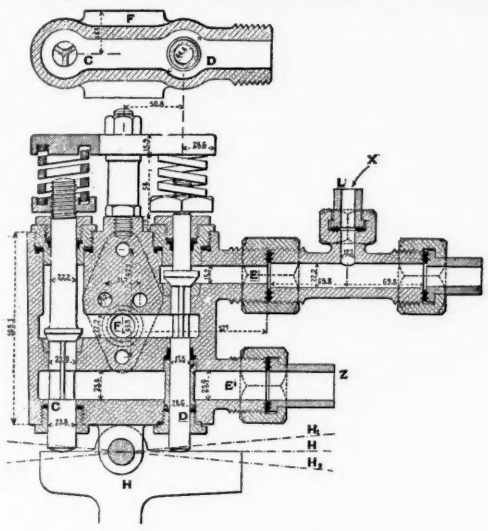


Fig. 4.—Hydraulic Operating Valve for 35-ton Press.

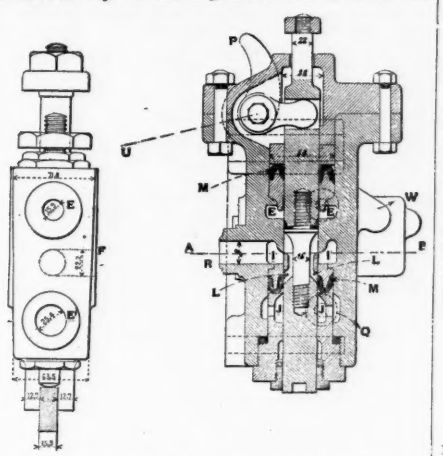


Fig. 5.—Section of the Operating Valve.

X.—Pipe to returning piston.
E.—Connection to accumulator.
R.—Attachment to cylinder.
Y.—Pipe from accumulator.
P.—Safety stop.
V.—Operating lever.
Z.—Exhaust or return pipe.
Q.—Exhaust port and return pipe connection.
W.—Returning piston.

the cylinder in communication with the accumulator, while raising it allows the cylinder to exhaust. In fig. 5, the action is exactly the reverse. The packing used to make the joint between piston and cylinders is in general simply a copper ring or washer made in the forms shown in section at M, figs. 2 and 5, by means of a tool shown in fig. 6. The copper is first carefully annealed and then placed on the die so that the outside face of the sheet will be compressed and the inside face (if these terms may be

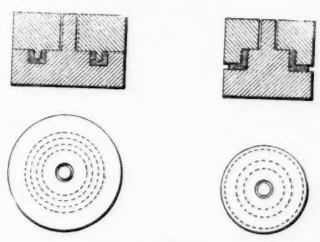


Fig. 6.—Dies for Making Copper Packing Rings.

applied to sheet copper as to leather) extended. A press, or in case the packing is small, a blow from a hammer, gives it the proper form. Fig. 6b shows the shape given to very small packing rings, which could only with difficulty be formed as shown at b_1.

The *Revue Générale des Chemins de Fer*, also gives complete detail description of the various tools and the character of work done by them, with some data on the relative cost of this work and the same work as formerly done by hand, and in a subsequent issue more complete data regarding the economy and efficiency of these tools.

Judge Brewer on the Nebraska Freight Rate Law.

The decision of the United States District Court on the application for an injunction to forbid the enforcement of the Nebraska rate law was delivered at Omaha, Nov. 12. It was read by Judge Dundy, who said that he concurred in the decision, but dissented on several subsidiary points and would subsequently reduce his opinion to writing.

The law, known as the Newberry Bill, House Roll 33, was passed April 12, 1893. It prescribes maximum rates for the transportation of freight within the State of Nebraska. Judge Brewer first decides that the technical objections to the legality of the act are unfounded. It was claimed that surreptitious alterations had been made, but it is held that even if this were so the supposed alterations were trifling. The claim that the State of Nebraska cannot regulate rates on the Union Pacific because that road was chartered by Congress, is disallowed. In the case of Ragan, 154 U. S. 413, it was held that such a circumstance did not exempt from State control. Congress could remove such a corporation from State control if it saw fit, and in the case of the Union Pacific the national law provides that Congress may reduce rates if the company earns more than 10 per cent.; it was claimed that this went to show that Congress intended to exercise control of rates on the Union Pacific, but Judge Brewer thinks not.

The Newberry law exempted railroads built since January 1, 1889, and this was claimed to be an unconstitutional discrimination. Attention was called to the fact that a part of the Rock Island main line was built since that date; but this claim is rejected; the protection of infant industries is justifiable and the fact that this piece of the Rock Island Road acquired a good business within a short time does not vitiate the rule.

The claim that this reduction of State rates was unlawful because it would compel the reduction of Interstate rates, is characterized as an extravagant pretension. The statute does not work a change in Interstate rates any more than an Act of Congress prescribing Interstate rates would legally work a change in local rates. Railroad companies cannot plead their own convenience or the effect of competition in restraint of the otherwise undeniable power of the State.

Judge Brewer rejects the argument that a Court of Equity has no jurisdiction in this case, and then goes on to discuss the reasonableness of the rates prescribed in the law. He says:

"No more difficult problem can be presented than this, there are so many matters which enter into it, and which must be taken into consideration before a satisfactory answer can be reached.

"What is the test by which the reasonableness of rates is determined? This is not yet fully settled. Indeed, it is doubtful whether any single rule can be laid down applicable to all cases. If it be said that the rates must be such as to secure to the owners a reasonable per cent. on the money invested, it will be remembered that many things have happened to make investments far in excess of the actual value of the property—injudicious contracts, poor engineering, unusually high cost of material, rascality on the part of those engaged in the construction or management of the property. These, and many other things, as is well known, are factors which have largely entered into the investments with which many railroad properties stand charged. Now, if the public was seeking to take title to the railroads by condemnation, the present value of the property, and not its cost, is that which it would have to pay. In like manner, it may be argued that when the legislature assumes the right to reduce rates, the rates so reduced cannot be adjudged unreasonable if under them there is earned by the railroad company a fair interest on the actual value of the property. It is not easy to always determine the value of railroad property. In the case before us there is abundant testimony that the cost of reproducing these roads is less than the cost of the stock and bond account or the cost of construction. Nevertheless, the amount of money that has gone into railroad property, the actual investment, is not to be ignored, even though such sum is far in excess of the present value. It is not always reasonable to cast the entire burden of the depreciation on those who have invested their money in railroads. Take the Union Pacific for illustration. At the time the Government created the corporation, to induce the building of this transcontinental line through a largely unoccupied territory, it loaned to the company $16,000 a mile, taking as security therefor a second lien on the property and granting to the corporation the right to create a prior lien to an equal amount, which was done. There is testimony tending to show that the road in Nebraska could be built to-day for $20,000 a mile. Would it be full justice to the Government, would it satisfy the common sense of right and wrong, would it be reasonable for the State of Nebraska to so reduce the rates that the earnings of the road would only pay ordinary interest on $20,000 a mile, and so, the holders of the first lien being paid their interest, the Government be forced to be content with only interest on one-fourth of its investment?

"Is there not an element of equity which puts the reduction of rates in a different attitude from the absolute taking of the property by virtue of eminent domain? In the latter case, while only the value is paid, yet that value is actually paid and the owners may reinvest and take the chances of gain elsewhere, whereas, if the property is not taken, the owners have no other recourse than to receive the sum which the property they must continue to own will earn under the reduced rates. Considerations such as these compel me to say I think there is no hard and fast test which can be laid down to determine in all cases whether the rates prescribed by the Legislature are just and reasonable. Obviously, however, the effect of the reduction upon the earnings is the first and principal matter to be considered. This is a matter of computation."

Justice Brewer then enters into an elaborate discussion of local freight business in Nebraska, and in conclusion says that:

"Having regard to the present condition of affairs in this State, the present volume of business done over these roads and any probability of a change in that volume, a reduction of 29½ per cent. in the rates for local freight is unjust and unreasonable to those who have invested their money in these railroad properties. I appreciate fully the embarrassment and difficulties attending an investigation of this kind. I am reluctant, as every judge should be, to interfere with the deliberate judgment of the Legislature. I have taken much time to consider this case in all its relations, and have come, though reluctantly, to the conclusion I have stated, and am, therefore, constrained to order decrees in behalf of the plaintiffs staying the enforcement of this tariff upon the companies named in the bills. It may be said that even if furnishing no reasonable remuneration to-day the result might be different under an increase of business. That, of course, is possible; and it may be that, as the volume of business increases, the time may come when the rates fixed by this house roll 33 will be reasonable and just. So there should be entered as a proviso to the decrees that leave is reserved to the defendants at any time that they are so advised to move the court for a reinvestigation of the question of the reasonableness of these rates."

The Conference of the British Iron Trade Association.

The first conference of this association ever held out of London took place in Glasgow recently. The subjects under discussion bore on economic rather than technical questions. They received interest from the present depressed state of the British Iron Trade and the inroads that Belgiars and Germans are making in territories heretofore occupied by Great Britains, notably in India. The questions discussed were comparative freight rates both by rail and ship; hours and cost of labor; light railroads for agricultural districts; British resources for producing pig iron and new uses for iron and steel. Mr. William Jacks, M.P., the president, submitted the following table showing a production of iron at the dates named, in gross tons:

	1871.	1882.	1893.
Great Britain.....	6,627,000	8,493,287	6,829,841
United States.....	1,720,000	5,178,121	7,124,502
Germany.....	1,278,000	3,469,719	4,700,000
Other countries.....	2,158,000	4,180,572	4,585,000
Total.....	11,783,000	21,321,699	23,239,343

NOTE.—Our make for 1871 should be 1,706,793 tons, and for 1882 it should be 4,623,323 tons.

In 1871 Great Britain supplied over one-half the world's make; in 1882 about 40 per cent., and in 1893 only about a quarter; her absolute as well as relative makes having declined. Mr. Jacks ascribed the present unfortunate state of affairs to "the much greater success of foreign competition," and cited the reports of a committee which concluded that it is due:

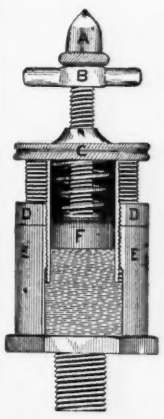
"1. To the lower range of wages paid on the continent;
"2. To the command of cheaper foreign freights both by land and by sea.
"3. To the higher profits made in protective home markets, enabling German manufacturers to sell surplus product in outside markets at a low profit or at no profit at all."

As to the first it is said British wages "are at least 50 per cent. more than the corresponding wages paid on the continent." Of the second it was said that all the freights from Dusseldorf to London are lower than from the Birmingham district to London, and generally both Germany and Belgium seem to be paying much less for assembling the raw materials of manufacture and marketing the products than the British. One speaker, Mr. Monks, thought that rail rates were not being directly advanced, but Mr. Jeans, the Secretary of the Association, in a paper "Recent Legislation as to Railway Charges and Classification," showed that an advance in rates was made by reclassification of articles.

But the worst charges are made against British steamer lines, which charge less from Antwerp than from London. As one of these lines, the Peninsular & Oriental, was said to be in receipt of a subsidy of £1,000 per day, the iron masters object to their charging 10s. on Belgian iron from Antwerp to India as against 15s. 9d. on British iron from London. But as there is a weekly line of German steamers from Hamburg to India calling at Antwerp this is probably a strategic move to break down the German line. Belgium, which sends nearly as much iron to India as England, and 53 per cent. of the steel against 37 per cent. by Great Britain, gets the cream of the fight—while it continues. It amounts, however, to a handicap of 5½ per cent. This with the higher railroad freights in England is estimated by Mr. J. Lyon of London in a paper read before the conference to amount to: "sea freights 5s. 9d.; railway freights 8s. 6d.—equals 14s. 3d., which the British railway and British steamship owners obtain from the English iron masters per ton of iron exported and until this glaring inconsistency is set right British iron must gradually but no less surely cease to be exported to India."

Mr. Jeremiah Head's paper on "New Applications of Iron and Steel" described our steel frame buildings and the great demand they make; 20 per cent. of our total make of steel ingots going into beams, girders and pillars.

Automatic Compression Grease Cup.



The illustration shows France's patent grease cup for automatic and compression action combined, which is sold by the Henry C. Ayer & Gleason Co., Philadelphia, Pa. The cup shown is the one designed for use on locomotives, but other forms are made for various other purposes. By screwing down C the spring is followed up and the tension maintained to the end of the stroke; F is a cup-shaped leather plunger, tight at all times; D is a lock nut. The cup can be managed for refilling entirely by hand, thus avoiding the use of wrenches. The pressure being adjustable and uniform through the whole stroke either hard or soft grease can be used without choking the feed.

The Graham-Mitchell Draft Rigging.

This is an adaptation of the well-known Graham draft rigging to a drawbar with strap-yoke in place of tail-pin. The filling-block between the sills is substantially the same; the only change is a vertical slot directly over the end of the drawbar through which the bolts or rivets securing the strap-yoke to the drawbar may be taken out or put in without taking down the entire draft rigging, should the drawbar break.

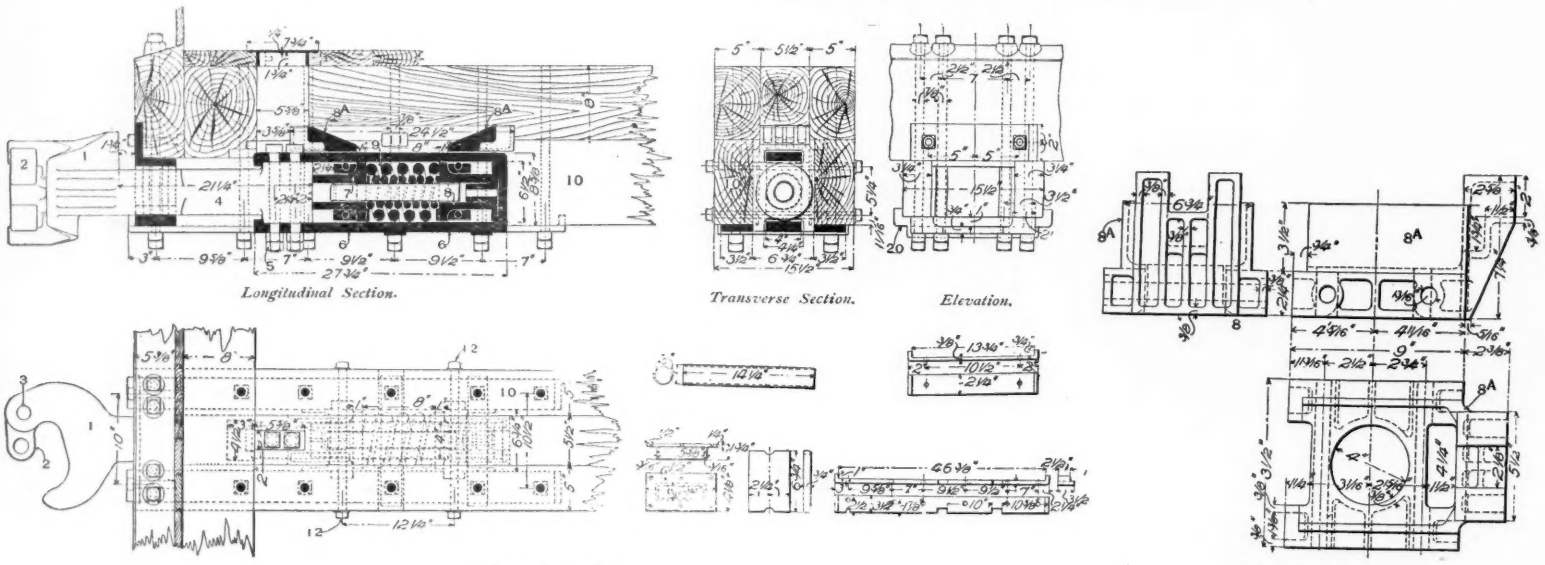
This slot is covered with a wrought or malleable iron plate in the floor. The stop-castings also have a slot in the horn at the top to allow these bolts to be taken out. In the construction shown in the engravings the end sill is cut away for a few inches directly in front of the bolts securing the drawbar and strap yoke, to allow the drawbar free movement outwardly in pulling, without striking them against the end sill. The strap-yoke is lipped over the square lugs on the end of the drawbar, as an additional safeguard. The top arm of the strap-yoke passes through a slot in the stop-castings and the lower arm through a groove, both of which are shown in the engravings.

The followers fit into the stop-castings and bear against the springs, and both followers and springs are the same as those on the ordinary Graham draft rigging. A piece of pipe long enough to go partly through each follower and loosely fill the hole cored in it, is used for preventing lateral or vertical movement of the springs, and so preventing them from wear against the strap-yoke.

A thrust-plate is used back of the inner follower to convey the strain uniformly to the entire surface of the inner end of the strap-yoke. This thrust-plate has a horn, which fits into the hole through the outer follower, and is longer than the entire movement of the spring, so as to prevent displacement, and the thrust-plate fits so closely into the inner end of the strap-yoke that it is unable to turn in it. The flanges shown also help to hold it.

The draft timbers are gained as for the ordinary Graham rigging. The draft irons on the bottom of the draft timbers are slotted for the stop-castings as usual, but are carried outward far enough to lip up over the drawbar carry iron, thus making it impossible for the drawbar to pull out and fall on the track, even should the strap-yoke or the bolts which hold it break. The draft timbers are bolted to the sills and have cross braces at the bottom substantially the same as the Graham draft-rigging.

The attachment has been patented and the patent also covers the arrangement of a strap-yoke put on sideways instead of over and under the spring, and in this latter arrangement, the hole through the floor and filling block is dispensed with.



Graham-Mitchell Draft Rigging.

The City & South London Railway.

In recent issues of the *Engineering Review* (London) there appears a short paper by Mr. J. H. Greathead on the City & South London Railway. Our readers must be tolerably familiar with the construction and operation of this work, but we reprint a portion of Mr. Greathead's paper as it has special interest coming from him and also fresh interest now that the question of rapid transit is so important in New York, Chicago and Boston.

As far back as 1868, I had constructed, in conjunction with the late Mr. Peter Barlow, who originated the enterprise, the subway under the Thames at the Tower. While engaged in this work, I introduced improvements in the methods of tunneling which rendered readily possible similar enterprises in the form of electric railroads. In the construction of the Tower Subway, the maximum progress attained was 9 feet per day, in three 8-hour shifts. On the City & South London line, however, we were enabled to attain a maximum progress of 16 feet per day, by two shifts in the 24 hours. This remarkable increase of progress was mainly due to the introduction in the last-named enterprise of improved methods of excavation of the materials from the path of the shield, and by filling the annular space left by the advance of the shield around the iron lining of the tunnel. This result was achieved by the use of hydraulic power, which forced forward the shield and drove the piles or wedges into the solid material in front, by which it was broken up, and its removal was greatly facilitated. At the same time, the annular cavity outside of the tunnel was filled by compressed air, which discharged a semi-fluid cement from a closed vessel in which it was mixed and continuously agitated—another improvement which assisted our progress materially; while a third improvement was the adoption of certain means of passing through water-bearing strata, which was altogether absent in the case of the Tower Subway, and which became necessary at an early stage in the progress of the City & South London Line—namely, the use of compressed air in combination with a shield and an iron tunnel.

One of the principal features which have distinguished the underground railroads of London from most enterprises of a similar character elsewhere, is the fact that they allow of trains being run right through London from some of the outlying suburbs. It has been objected that this was an advantage which could not be maintained if we were to be dependent upon overhead or underground electric railways. On looking into the matter, however, I came to the conclusion that the absence of this facility of interchange and transfer was an advantage rather than the reverse. At all events, it has long been well-known to the engineers and others concerned, that whereas the underground railroads of London have not been financially a success, the overhead lines of New York have been wonderfully and exceptionally prosperous. This being so, I made up my mind that it need not necessarily happen that a new system of railroads between different parts of the metropolis should form junctions with existing railroads, and this was a very important point, because it permitted of the new lines being constructed at such a depth as to be entirely out of the way of other structures, it being, of course, presumed that in London overhead lines were out of the question. This conclusion being granted, there appeared to be no difficulty in the way of carrying the proposed new lines entirely or almost entirely under the public streets of the metropolis, thus getting rid of the great cost incidental to interfering with or acquiring private property. . . .

It is so generally known that I am doubtful whether I should stop to state it that the special features of the system with which my name has become associated were, first the construction of a tunnel at a great depth; and next, the construction of hydraulic lifts to transport passengers to and from the level of the line. . . .

The general features of the City and South London Electric Railway, and of others that are about to be constructed on the same system, are already tolerably well known to engineers. Nevertheless, I should hardly be justified in quite overlooking this part of the subject. Each of the two tunnels is 10 ft. in diameter inside, and is formed of rings of segments bolted together by internal flanges. Each ring is 1 ft. 7 in. long, and is composed of six equal segments, and a short key segment with parallel ends. The flanges are 3½ in. deep by 1¼ in. thick, and are bolted together by ¾ in. bolts. The circumferential joints are made by tarred rope and cement, and the longitudinal joints by pine strips. The method of erection is almost as simple as the tunnel itself. At the head of the subway, supposing a short length of tunnel to be already in place in the clay which underlies the River Thames, there was a steel shield consisting of a cylinder 6 ft. long and of sufficient diameter to slide easily over the portion of the subway already bolted together. . .

As the shield moved forward it left at its rear an annular space, of about an inch, between the iron and the surrounding clay, and this was immediately filled with grouting to prevent any subsidence either of the tunnel or of the ground. The grouting, made of blue lias lime and water, was mixed in a wrought iron vessel, provided with paddles which could be worked from the outside. The vessel was closed, and compressed air, at a pressure of 30 lbs. to 40 lbs. per square inch was admitted to it, while the paddles were kept at work. By means of a hose pipe ending in a nozzle, the grouting was forced through holes left in the iron lining into the space between it and the clay, until the entire cavity was filled with a shell of cement which fitted it exactly, and formed an impermeable coat round the subway, protecting it from moisture and oxidation. After the shield had been moved forward a ring of segments was bolted in, the average rate of progress being about 12½ ft. in 24 hours.

No street surface was taken to form a contractor's yard, but in place of this a stage was erected in the river and from this a shaft was sunk through the river bed to the requisite depth. On the stage there was erected a crane which lifted the skeps of clay, and delivered them on to a small tramway, along which they ran to deliver their contents into barges. The shaft was 13 ft. in diameter, and was made of cast iron rings, each cast in one piece. The thickness of metal was 1⅛ in., except at the bottom where it was thickened on the inside to form a cutting edge. This shaft was sunk in the usual manner, by removing the material from inside it with a grab, and it descends nearly to the crown of the upper tunnel. From this point it was carried down in brickwork, four mouthings for the two subways being made in it of the same material.

The tunnels, where actually under the river, were driven through clay of varying consistency, and no water was encountered, but in driving the upper of the two tunnels towards the City terminus, coarse gravel was met with about 50 yards from the river, and at a depth of 40 ft. below high-water level, giving a free communication between the river and the tunnel. Here compressed air was used in combination with the shield for the first time in the history of engineering, notably near the southern end of the railroad. The same system was employed at other points of the railroad for driving both the tunnels through about 200 yards of coarse gravel and sand under a head of 35 ft. of water with perfect success, the iron tunnels being made absolutely water-tight. This mode of subaqueous tunnelling was subsequently adopted at the St. Clair Tunnel between Canada and the United States, the Hudson Tunnel at New York, tunnels under the Clyde at Glasgow, and other works in this country and abroad, and is being employed in the Blackwall Tunnel and the Waterloo and City Railway Tunnels.

The trains were originally intended to be drawn by endless wire ropes running up one tunnel and down the other from a central motive power station near the Elephant and Castle. There were to be two wire ropes; one starting from the engine house, proceeding to the City along the "up" and returning along the "down" line, the other making a similar circuit in the opposite direction to and from Stockwell. The rope was to travel in the first instance at the rate of ten miles an hour, giving an average speed of the trains of about nine miles per hour, including stoppages. The cable system would have possessed certain advantages over any system of traction by separate locomotives; the weight of train for a given number of passengers would be less, the trains would get into speed more quickly, and to attain a given average speed the maximum speed would consequently be lower; but the wear and tear and loss of power would be very considerable with a high cable speed. When, therefore, the rapid advances made in electric traction during the construction of the railroad made that system available, it was determined to adopt it for the working of the trains mainly on account of the higher speed which it rendered practicable.

There are gradients of 1 in 30 against the load, and, in one place, of 1 in 14 with the load, and curves in places as sharp as in 1½ chain radius. The line is consequently not an easy one for locomotive working. At the termini the lines converge into one tunnel, and the locomotive of every train has to be changed. This, on a short line, involves a large proportion of shunting, which could be avoided, as it is on the Liverpool Overhead Railway, by the use of electric motors on the carriages themselves instead of on separate locomotives. There are also other advantages attached to motor carriages which have been recently fully discussed at the Institution of Civil Engineers in connection with the Liverpool Overhead Railway.

The generating station at Stockwell is equipped with four engines, each driving one generating dynamo. These engines are of the vertical compound open type, and were built by John Fowler & Co., of Leeds; they run at 100 revolutions per minute, are each capable of indicating 400 h. p., and drive the dynamos with link-leather belts. The engines are fed by eight boilers of the Lancashire type, set on Livet's principle, and arranged in two groups of four, with independent flues and chimneys.

There can be no question that rapid transit facilities in great cities in the immediate future will take the shape of railways in tunnels under streets, deep enough generally to avoid interference with other underground structures and worked by electricity.

Train Accidents in the United States in October.

COLLISIONS.

REAR.

§ 1st, on Pennsylvania road, at Malvern, Pa., a freight train ran into the rear of a preceding freight, injuring 2 trainmen.

2d, on New York, Pennsylvania & Ohio, near Geneva, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one; 3 tramps killed.

2d, on New York Central & Hudson River near Schenectady, N. Y., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 6 cars and blocking all four main tracks. A brakeman was injured.

4th, on Atchison, Topeka & Santa Fé, at Sealy, Tex., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, badly damaging the caboose. The conductor was injured.

8th, on Lehigh Valley, at Manchester, N. Y., the first section of passenger train No. 4, standing at the station, was run into at the rear by the second section of the same train which approached at uncontrollable speed. Two passengers and one trainman were injured.

9th, on Lake Shore & Michigan Southern at Swanton

O., a freight train ran into the rear of a preceding freight, injuring the engineer.

17th, on Pennsylvania road, near Collins, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, badly damaging 3 cars. It is said that the engineman discovered the breakage and tried to keep the front portion of the train in motion, but an air hose burst and stopped him.

17th, 4 a. m., on Pennsylvania road, near Ridge avenue Station, Philadelphia, a freight train broke in two and the rear portion afterward ran into the forward one, derailing 4 cars, which fell 75 ft. into the Schuylkill River.

18th, on Boston & Maine, at Somerville, Mass., a passenger train ran into the rear of a preceding freight, badly damaging 6 freight cars. A baggageman was injured.

23d, 2 a. m., on New York, Chicago & St. Louis, at Claypool, Ind., a freight train ran into the rear of a preceding freight, wrecking caboose and one car, which took fire and were burned up; 1 employee injured.

23d, 5 a. m., on Kansas City, Fort Scott & Memphis, near Olathe, Kan., a freight train running at a considerable speed ran into an empty car, which had run out upon the main track uncontrolled, and 7 loaded cars were wrecked. The fireman was killed and the engineer injured.

27th, on Erie & Pittsburgh, at Newcastle, Pa., a passenger train ran into the rear of a preceding freight, damaging the passenger engine and a pusher attached to the freight. The passenger conductor was injured. There was a dense fog at the time.

28th, on Pittsburgh, Fort Wayne & Chicago, near Lima, O., a freight train ran into the rear of a preceding freight, derailing 6 cars, which fell down a bank and were wrecked. One of the cars took fire and a part of the wreck was burned up. Three trainmen were injured. There was a dense fog at the time.

28th, on Pennsylvania road, at Croydon, Pa., a freight train ran into the rear of a preceding work train, making a bad wreck. Two employees were killed and 22 injured.

And 30 others on 22 roads, involving five passenger and 42 freight and other trains.

BUTTING.

2d, on Cleveland, Lorain & Wheeling, at Paul's, O., butting collision between passenger trains 35 and 36, doing slight damage. Six passengers and 2 trainmen were injured. It is said that the engineer of the northbound train saw a freight train on the side track and assumed that it was the passenger train.

4th, on Southern California, at San Bernardino, Cal., a passenger train ran over a misplaced switch and into the head of a freight train standing on the side track, badly damaging both engines and several freight cars The passenger conductor and one passenger were injured.

10th, on Minneapolis, St. Paul & Sault Ste. Marie, at Turtle Lake, Wis., passenger train No. 8 ran into some empty freight cars which had escaped from a side track, and the engine was overturned. The fireman and the baggageman were injured. It is believed that the cars were pushed out of the side track by a freight train which was switching at the other end of it.

17th, 2 a. m., on Richmond, Fredericksburg & Potomac, near Richmond Va., butting collision between a freight train and an empty engine, badly damaging both engines. Both enginemen were injured.

19th, on New York, New Haven & Hartford, at Drownville, R. I., a southbound passenger train ran into a northbound freight which had been placed on the southbound track to avoid a passenger train running north. There was a dense fog at the time; engineer and one other man injured.

23d, on Southern Pacific, near Walker, Tenn., butting collision between a passenger train and a freight, badly damaging two baggage cars. Two trainmen were killed and four injured.

29th, on Philadelphia, Wilmington & Baltimore, near Bayview, Md., butting collision between empty engines; engineer badly injured

31st, on Fremont, Elkhorn & Missouri Valley, at Blair, Neb., butting collision between freight trains, wrecking both engines and three cars loaded with cattle. One of the conductors had an order to meet train 31; on examining the register at a junction he saw the number 31 and assumed that the train he was to meet had passed off the line, but in point of fact the figures referred to the day of the month and not the number of a train.

And 6 others on 6 roads, involving two passenger and 10 freight and other trains.

CROSSING AND MISCELLANEOUS.

1st, at Sunbury, Pa., a passenger train of the Pennsylvania road ran into a passenger train of the Northern Central at a crossing, wrecking the smoking car of the latter train. The passengers were violently shaken, but only ten were seriously injured.

1st, at Mansfield, O., a freight train of the New York, Pennsylvania & Ohio, ran into a freight train of the Baltimore & Ohio at the crossing of the two roads, wrecking about 20 cars. Five trainmen and a tramp were injured.

4th, on Boston & Maine, at Wakefield, Mass., collision between an empty passenger train and a freight, wrecking engine and 12 freight cars; engineer and fireman of passenger train injured.

6th, on New York Central & Hudson River, at Walworth, N. Y., collision of freight trains, injuring 2 trainmen.

14th, near New Orleans, La., a passenger train of the East Louisiana road, running on the track of the New Orleans & Northeastern, ran into a passenger train of the Louisville & Nashville at the crossing of the two roads, overturning three cars and derailing the East Louisiana engine and one of its cars. About 12 passengers on the Louisville & Nashville train were injured.

17th, on Texas & Pacific, near Shreveport, La., a freight train ran into some freight cars which had run out from a side track, wrecking the engine and several cars. Three trainmen were injured. Two freight cars were burned up.

17th, on Pennsylvania road, at Fortieth street, Philadelphia, a switching freight train ran into a similar train running on the main track, overturning one car and wrecking a signal house. The signalman was injured. The engine of the train on the main track was deserted and ran to Thirty-sixth street, where it collided with some empty passenger cars.

20th, on Pennsylvania road, at Jeannette, Pa., several cars broke loose from a freight train and ran down a grade some distance; they struck a car standing on a side track and killed 3 men lying inside of it asleep.

22d, on Atchison, Topeka & Santa Fé, at Chillicothe, Ill., a passenger train collided with a gravel train, badly damaging both engines. One engineer was injured.

22d, on Baltimore & Ohio, near Scott Haven, Pa., a freight train descending a grade was cut in two to permit the engine to back off some cars without first stopping the rear portion of the train, but the latter became uncontrollable and collided with the forward part, wrecking 7 cars. A tramp was killed and another injured.

23d, on New York, New Haven & Hartford, near Dartmouth street, Boston, a passenger train running towards Boston ran over a misplaced switch and into the side of a passenger train running in the opposite direction, wrecking the locomotive of the latter and badly damaging the other engine.

31st, 1 a. m., on Delaware, Lackawanna & Western, at Foster, Pa., a freight train ran over a misplaced switch and into the side of a passenger train passing on the main track just at that time; 1 engineer and 2 firemen were killed.

31st, night, on Southern Railway, near Van Arsdell, Ky., a freight train descending a grade broke in two; the engineman with the forward portion ran on two or three miles over undulating grades and set off the front portion of the train on a side track. He then ran back with the empty engine, but before going far collided with 5 cars which had broken away from his part of the train after the first separation. The engine was badly damaged and 2 cars were wrecked. A brakeman riding on the tender was killed and the engineman was injured.

31st, 11 p. m., at Hagerstown, Md., 4 cars that had broken away from a freight train on the Cumberland Valley ran at high speed into a freight train of the Norfolk & Western, at the crossing of the two roads. The wreck took fire and part of it was burned up. A brakeman was injured.

And 20 others on 18 roads, involving 7 passenger and 30 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

5th, on Birmingham & Atlantic, near Coosa Valley, Ala., a mixed train broke through a bridge and all the cars fell into the stream 50 ft. below the track. One passenger was killed and the conductor and two trainmen injured.

7th, on Southern Pacific, at San Antonio, Tex., a freight train was derailed by spreading of rails and 3 cars wrecked, A brakeman was injured.

23d, on Macon & Northern, near Godfrey, Ga., a freight train fell through a trestle bridge which had been weakened by fire, and the engine, 5 cars and a caboose fell through. The wreck took fire and was burned up. The engineer was killed and 2 other trainmen injured.

26th, on West Virginia, Central & Pittsburgh, at Dawson, Md., 2 cars of a passenger train were derailed by spreading of rails. Two trainmen were injured.

26th, on Cleveland, Canton & Southern, at Suffield, O., a freight train was derailed by a defective frog and 17 cars of coal were wrecked. Two men stealing a ride were injured.

And 6 others on 6 roads, involving 4 passenger and 2 freight trains.

DEFECTS OF EQUIPMENT.

11th, 4 a. m., on Oregon Railway & Navigation, near The Dalles, Ore., a passenger train was derailed by the breaking of a flange and the engine was wrecked. The fireman and one tramp was injured.

16th, on New York Central & Hudson River, near Wampsville, N. Y., a freight train was wrecked by the derailment of several cars near the middle of the train in consequence, it is said, of the sudden application of the air brakes due to the rupture of a hose. All four main tracks were blocked. One tramp was injured.

29th, on Beech Creek road, near Peale, Pa., 17 cars in a freight train were derailed and wrecked by a brake beam which fell upon the track. Three tramps were killed.

And 9 others on 7 roads, involving 9 freight trains.

NEGLIGENCE IN OPERATING.

1st, on Southern Pacific, near Delano, Cal., passenger train No. 20 was derailed by a misplaced switch. Two sleeping cars were overturned. Three passengers and one trainman were injured.

2d, on Missouri Pacific, at South Leavenworth, Kan., a passenger train was derailed by a misplaced switch. A boy stealing a ride was killed and the engineer and fireman injured.

9th, 3 a. m., on Southern Railway, near Saluda, N. C., a freight train became uncontrollable on a descending grade and the engine and 12 cars were derailed and wrecked. The engineer, fireman and 1 tramp were killed and the conductor injured.

And 8 others on 8 roads, involving 1 passenger train and 7 freight.

UNFORSEEN OBSTRUCTIONS.

2d, on Atlantic & Pacific, at Dennison, Ariz., passenger train No. 3 was derailed by running over a steer and the engineer and fireman injured.

3d, on Harriman Coal & Iron Company's Railroad, near Harriman, Tenn. a train carrying a large number of convicts was derailed by running into a landslide and several cars were wrecked. Three guards and over 30 convicts were injured, some of them fatally.

7th, 2 a. m., on Minneapolis, St. Paul & Sault Ste. Marie at Tomahawk Junction, Wis., a passenger train was wrecked by breaking through a trestle which had been maliciously weakened, killing the fireman and badly injuring the engineer. The stringers of the trestle had been sawed nearly apart in two places.

7th, on Southern Railway, at Vance's, Tenn., a west bound fast express train, consisting of 8 cars, all vestibuled, was derailed by running over a track bolt lying upon the outer rail of a curve, and the whole train was badly wrecked. The wreck took fire from coals in the engine, and one postal car, one express car, three day cars, the dining car and one sleeping car were burned up. The rear sleeper was not derailed and was saved. Nine passengers were injured. The engineer was fatally injured and the fireman was scalded, but not dangerously; no other trainmen were seriously hurt. It is believed that the bolt was maliciously placed upon the track. The train was running at full speed, but all the cars back of the baggage cars kept in line and no one of them was badly damaged by the shock.

8th, on Louisville & Nashville, at Bell's, Tenn., a passenger train running at high speed was derailed and the engine and first 2 cars overturned; engineer, fireman and 2 mail clerks injured. It is said that the derailment occurred at a maliciously misplaced switch.

11th, 1 a. m., on Atchison, Topeka & Sante Fé, near Denver, Col., the engine and first 4 cars of a passenger train were derailed at a point where spikes had been maliciously pulled. Information had been received that robbers would attempt to derail the train and it was running very slowly at the time it went off the track. No robbers were seen, however.

11th, on Houston, East & West Texas, near Nacogdoches, Tex., a freight train was derailed by running over a cow and the engine and 3 cars wrecked; conductor and 2 other trainmen injured.

16th, on Chesapeake, Ohio & Southwestern, near Newbern, Tenn., a reight train was derailed by an obstruction on the track and several cars were wrecked; engineer, fireman and one brakeman injured.

19th, on Kentucky Central, near Rankin, Ky., a freight train was derailed by running over a cow, and 20 cars fell down a bank. Two brakemen were injured, one of them fatally.

22d, on Atchison, Topeka & Santa Fé, at the east end of the bridge at Atchison, a passenger train, running backward, was blown off the track by a high wind, doing considerable damage.

25th, on Gila Valley, Globe & Northern, near Safford, Ariz., a passenger train ran over a steer and a car was derailed.

And 5 others on 5 roads, involving 2 passenger and 3 freight trains

UNEXPLAINED.

2d, on Cape Fear & Yadkin Valley, at Jonesborough, N. C., a freight train was derailed and 8 cars wrecked. A brakeman was killed.

2d, on Southern Pacific, near Oakland, Cal., the rear car of a passenger train was derailed and fell off a trestle, lodging partly in the water. Several passengers went down with the car and 2 were killed; 16 others who jumped off before it went down were slightly hurt.

4th, on St. Louis & San Francisco, at Smithfield, Mo., a freight train was derailed, making a bad wreck. The conductor and 2 brakemen were killed and 2 other trainmen injured.

6th, on Chicago & Alton, at Wilmington, Ill., a freight train was derailed and 12 cars wrecked. Two brakemen were injured.

7th, on Atlanta & West Point, near Cusseta, Ala., a passenger train was derailed just before entering upon a long bridge; the engineman to avoid ditching the train at a very bad spot put on full steam and pulled most of the train across the bridge, but the cars all fell down a high bank just as they had got across. Four passengers were injured, one of them fatally.

8th, on Chicago, Rock Island & Pacific, at Sleepy Hollow, Ia., a freight train was derailed and 20 cars were wrecked; engineer, fireman and one brakeman killed and conductor fatally injured.

10th, on Cleveland, Cincinnati, Chicago & St. Louis, at Cincinnati, a freight train was derailed and a brakeman fatally injured.

13th, on Wabash Road, near Riverton, Ill., passenger train No. 43 was derailed at a frog and the engine fell into the ditch. The engineman was injured.

19th, on Central of New Jersey, at Communipaw, N. J., a car in a switching freight was derailed and a brakeman was killed.

20th, on Pennsylvania Road, at Carpenter, Pa., a car in a freight train was derailed and ran against the signal tower, injuring the signalman and one other employè in the building.

20th, on Baltimore & Ohio, near Cameron, W. Va., a passenger train was derailed, and the engine and 5 cars were ditched. The fireman was injured.

21st, on Illinois Central, near Rutland, Ill., a car of lumber in a freight train was derailed and, with several others, was badly wrecked. Two tramps were killed and one injured.

27th, on Boston & Maine, at East Boston, Mass., an empty engine jumped the track and the engineer was badly injured.

And 18 others on 13 roads, involving one passenger train and 18 freight and other trains.

OTHER ACCIDENTS.

3d, on Philadelphia & Reading, at Rickenbach, Pa., a passenger train ran into the station building which had been blown upon the track by a high wind, wrecking the building and damaging the cab of the locomotive. The engineman was injured.

12th, on Delaware, Lackawanna & Western, at Glen Ridge, N. J., the engine of a passenger train was wrecked by the explosion of its boiler and the engineer and fireman fatally injured. The boiler was turned completely over and wrecked the station platform.

17th, on Baltimore & Ohio, near Bissell, Pa., a passenger train was damaged by a dynamite cartridge which exploded under one of the cars. One baggage car was badly damaged.

20th, on Columbus, Hocking Valley & Toledo, near Delaware, O., an empty engine running at considerable speed was badly damaged by the breaking of a parallel rod; engineer and one other employè injured.

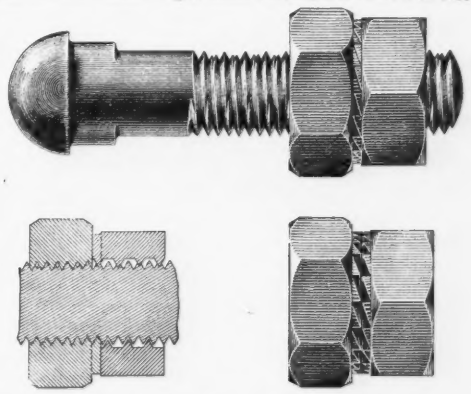
31st, 7 p. m., on Williamsport & North Branch, near Muncey Valley, Pa., a car in a passenger train was set afire by some paint which was spilled from a jug in the hands of a passenger and which was ignited while being cleaned up. There was no water at hand and the car was burned up with considerable mail and baggage.

And 4 others on 4 roads, involving 4 passenger trains.

A summary will be found in another column.

The Fulton Nutlock.

We show in the accompanying illustration a nut-lock recently patented by Mr. D. M. Fulton, of Baltimore. This lock is made on the principle of the jam nut, and it embodies a variation from the common use of two nuts similarly threaded and screwed in parallel motion, against each other. In this device the bolt has, in addition to the usual right-hand thread, a second and left-



hand thread which controls the lock-nut. As this second nut is *backed down* upon the first, should the latter begin to loosen, its backward turn would tighten the lock-nut against it. To prevent the lock-nut working away from the first nut shallow teeth are formed on their adjoining surfaces, and while the elasticity and slope of the metal may permit these to pass under the force of a wrench after their first engagement, their straight sides are sufficient to prevent the working away of the lock-nut.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contract for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

A correspondent calls attention in another column to the fact that, even without the Sykes lock, block signaling can be made safer than it usually is in this country, by the employment of visual as well as audible telegraph apparatus. This point, omitted by us in speaking on the subject, is important to remember in explaining the remarkable record of the English railroads for safety. It was forcibly brought to notice a few years ago, when a collision occurred on a four-track road in this country in consequence of an error by the signalman as to which track his signaling applied to. If he had had a visual apparatus, one for each track, probably he would not have made the mistake. But there would seem to be no reason, except expensiveness, why, if a road is going to put in signaling apparatus, it should not put in the best eletric locks; and our American signal manufacturers ought to be able to produce these about as cheaply as the simple non-locking apparatus so long used in England. As to the extension of the signal code, proposed by our correspondent, we are not sure that we agree with him. Where there is no other means of communication the bell code should be very full, but where the telegraph is available most signalmen would use that instead of the bell code, unless the latter were made familiar by constant use; and many of the signals would not be called into use very often unless the superintendent compelled it as a matter of training. American railroad officers are now well aware of the fact—which they formerly overlooked—that signaling can be done without the Morse telegraph, but it seems probable that the telephone will come into use as fast as the telegraph goes out, so that there is no great likelihood that we shall need a bell code in the future any more than we do at present. Such a code is not generally used with the best success except by men who do considerable thinking; if our correspondent, by introducing it, can induce his signalman to rise above mere machine work, perhaps he will do well to introduce it.

One of the obstacles constantly encountered by the manager of a "Car Service Association" in the collection of demurrage on freight cars, is the fact that the more a demurrage charge is needed, the less does the consignee feel like paying it. Probably this is no more anomalous than hundreds of other cases in which the goods which cost the most must be sold for the least money, but it is very annoying, all the same. A marked instance is the case of the contractors building the jetties at Galveston harbor, who use enormous quantities of stone which has to be brought to them on cars. It appears that the Texas railroad commission had yielded to the contractors' demands so far as to fix ten days as the free-time limit, but they were not satisfied even with that and they so persistently refused to pay that the Texas Car Service Association had to sue them. It won the suit, but the contractors then tried to have the free-time limit made still longer. The Commissioners, however, stood firm and refused to lengthen it. It seems too bad, of course, to handle coarse rocks twice, for a very little handling will often increase their cost to the user by a large percentage, and in this view of the case it is no wonder that the contractor wishes to unload every piece of stone at the precise point where it is to be used; but the stock of cars owned or controlled by a railroad has been provided and is held for the purpose of affording transportation facilities to all the shippers along the line of its road, and the manager of the road is bound to see to it, to the best of his ability, that no customer is unduly favored as compared with any other. He must charge demurrage on the great majority of his cars in order to prevent their use as store houses, and therefore he must charge on stone cars. There is considerable inequality at best between users of different cars, without the introduction of arbitrary elements in favor of shippers already favored.

Tramps and the Canadian Railroads.

Railroad officers operating in Canada seem to be able to take care of their tramps neatly and expeditiously. Mr. Morford, Division Superintendent on the Michigan Central (Canada Southern), tells us that he has had no trouble with tramps for a year and sends us extracts from the Criminal Code of 1892 which will show what the legal provisions are with regard to certain crimes against railroad property. But after all it is not so much a question of law as of the administration of law. There are a few civilized communities in which the laws are inadequate, but there are many, this side of the border at any rate, in which the laws are adequate but their enforcement is very feeble when railroads are concerned.

Mr. Morford says that for tramps they invariably use the vagrant act outlined below. Each railroad has its own police and the railroad police know all of the police judges along the lines of their respective roads, so that they can co-operate promptly and with the least possible friction. The policy in dealing with tramps in Mr. Morford's territory is to run them in when the weather is fine, which is just the time when they want to be out and about. In September, a year ago, a gang was sent from St. Thomas to the Kingston penitentiary, and that seems to have been the final discouragement of this enterprise on the Canada Southern. Drunk and disorderly persons on trains or about stations are dealt with under the vagrant act, being turned over to the local municipal officers.

If a tramp is found in a car or breaking a seal he gets one year in state's prison; if he steals anything he gets from seven to fourteen years in the penitentiary. By the Criminal Code any one is made guilty of an indictable offence and liable to two years' imprisonment who steals a ticket or order for passage on any railroad or similar public conveyance. Any one is liable to fourteen years' imprisonment who steals anything in or from any railroad station or building or any vehicle on a railroad.

In the case of offences committed on or in respect to the mails or anything carrying the mail, or in or upon any vehicle employed in a journey, or on any vessel employed on navigable waters, the person accused is considered as having committed the offense in any magisterial jurisdiction through which the vehicle or vessel passed in the course of the journey during which the offense was committed. If the centre line of the river or road is the boundary of two or more magisterial jurisdictions, the offense may be treated as having been committed in either one of these jurisdictions.

Any person is liable to one year's imprisonment who engages in gambling for gain on a railroad train or other public conveyance, and conductors, or other employees when authorized by conductors, are required by law to arrest any person who is believed to have committed or attempted to commit this offense, and to make the arrest with or without warrant and to make complaint before a justice of the peace. The conductor or other officer who neglects this duty is himself liable to a penalty of from $20 to $100.

Another admirable provision in the Canadian law is that which deals with the crime of train wrecking. Under this section of the Criminal Code every one is guilty of an indictable offense and liable to imprisonment for life who places any obstruction upon the track, displaces any rails, switch or other part of the track, shows misleading signals or does anything else with the intent to endanger the safety of any person traveling on a railroad.

The provisions of the vagrant act are very wide and cover everybody who cannot show that he has a legitimate means of getting a living and who does not conduct himself decently in all places.

The result of these stringent laws and of the zeal with which they are enforced is that the Canadian railroads are singularly free from tramps, from attempts at train wrecking and train robbing, and from the whole disgraceful train of evils of this class which afflicts the railroads of the United States. Another result is that the tramps who would naturally operate on Canadian soil drift over the border to the more congenial territory of the great republic. On this side of the border the only railroad that has attacked the tramp nuisance with anything like system and thoroughness, so far as are known, is the Pennsylvania. To be sure one influence is working here to keep down their numbers. Our beneficent system of letting people walk and sleep on the tracks, and ride on trucks and buffer blocks, disposes of a good many tramps every year; but it is a barbarous and shocking way of correcting an abuse. Killing is very rarely a good use to put a man to. It would be a great deal better to make tramping so unpleasant that the tramps would go to work.

The Economics of Lubrication.

There are few items of the expense account about which we find more variety of opinion and action than in the use of lubricants by the various departments. For the same class of work we may find one road using oils which cost several times more than those used upon another, yet when we consider the relative conditions of service there may be no evidence of increased work done with the high-priced oils to anywhere near balance the increase in first cost.

In the lubrication of either engines or cars, the first requisite is, of course, that the result shall be the smooth working of the various parts without wear or heating, at all speeds, and at all seasons. In order that there may be as little question as possible on this score, we often hear it urged, not only by dealers, but by users also, that "the best is the cheapest," the word "best" usually being synonymous with "highest priced." But this argument is often an excuse for not taking proper means to see that every man is drilled in the best way of using lubricating material. The pressure of the times is fast working a reform in this direction.

Lubrication has had to answer for a good many sins in mechanical work on the bearings and surfaces to be lubricated. Crank pins and journals may be too light for the service, so that the pressure per square inch is too heavy, or there may be a "spring" under conditions of heavy service. With some forms of trucks, either from being out of square originally, from bad design, or from settling with age or under loads, there may be uneven pressure on the journals, causing heat in spite of good lubrication.

Aside from good mechanical condition of the parts to be lubricated, we should of course have the best form of oil cups and feeders, so that the flow will be regular but only as fast as the service requires. There are many forms of these, especially for locomotives, which will do their work properly if well cared for. All oil packing receptacles like journal boxes should be tight and protected by proper covers and guards, so that there shall be the least loss of material and the least influx of dust and dirt.

When we are confident that our mechanical conditions, both as to the completeness of the surface to be lubricated and as to the methods of feeding, are as favorable as possible, we come to the item of individual care in the use of lubricating material. This is an extremely important branch of the subject, as the amount of material used by one man in doing certain work may be 50 per cent. more than that expended by another under about the same conditions. Many of the bearing surfaces on locomotives have to be oiled by hand, so that there is great chance for relative saving or loss under this head. A constant supervision on the part of competent inspectors is necessary, (no matter what their position is called) to see that all concerned are using the best methods to get good results. As a rule, those who are zealous in the service welcome suggestions, while those who object are usually persons with whom there is need of reform. The work of the car oilers, in packing and oiling at stations, of trainmen with hot boxes on the road, and the work of individual enginemen with their engines, must all be carefully watched until the practice is uniform and efficient, and then it has to be kept so. The inauguration of this class of systematic inspection, has resulted, more than once, under our own observation, in nearly doubling the mileage of a certain amount of oil on both engines and cars. One valuable feature in testing special oils has often been to show the managing officers how far the work done by the oil originally in use could be extended by careful watching and drill of the men, without causing delays from poor lubrication.

After we have brought our conditions of mechanical perfection in the movable parts, and care in use of lubricating material to a good basis, we are ready to consider the question of various lubricators for the different purposes, taking price and quality into consideration. If we are satisfied that we have insured the intelligent use of material, we may, with reason-

able safety, follow the principle that when no particular advantage is shown in the wearing quality of the lubricating material used, the cheapest in price will be the most economical. For nearly all purposes connected with engines and cars, it will be found that comparatively cheap grades of earth oils may be used with perfect safety, and will give large mileages. For the moving parts of engines, lard or some of the special oils may be used, while for cylinders there are several good oils and mixtures that give better results than the old-fashioned use of melted tallow alone.

For packing oil boxes, wool waste has its advocates, and it gives good service where conditions are favorable; but cotton of an ordinary mixed grade fills all average requirements, the thing being to have the waste body remain spongy and close to the journal rather than to sink into a soggy mass at the bottom of the box.

To sum up, the great requisites of good lubricating are judgment and care in the use of materials, and a disposition never to be satisfied with what is being done until careful study shows that the end has been reached as regards efficiency and economy.

Perhaps the reader will say that our title ought to be changed; that this article dwells upon mechanical ethics rather than the subject of lubrication; but it must be remembered that it is easier to get good lubricating materials at economical prices than to get good men who will regularly practice economy with material which some one else pays for. The art of buying suitable oil cheaply is comparatively well known, but in the art of training oilers not to be wasteful there is much room for improvement.

The Elevated Railroads in New York.

It has long been apparent that the passenger business done by the Manhattan Elevated Railway in New York declined the last year. The annual report now published shows a loss of over 11 per cent. in the number of passengers carried as compared with the year before. Officers of the Manhattan have insisted that the loss was principally due to the hard times and the shrinkage in passenger movement from that cause everywhere. This is doubtless partly true. On the other hand, the figures of the business done by the surface lines in New York City, which are now beginning to be available, but which are not yet so complete as to permit accurate comparisons, do not show the same percentage of loss. Some of them show actual gains, some of them large gains, some of them losses; but on the whole it will be found when the figures can be collected and summed up that the loss of travel on the surface roads is a good deal less in percentage than on the Manhattan. In fact, including the gains on lines where cables have been put in, it is very likely that there will be for the total street railroad system of New York, an actual gain. That is, it will be demonstrated that the improved facilities for travel on the surface have cut into the business of the elevated system somewhat seriously.

To get at a plausible estimate of the loss due to hard times and the loss due to the improvements in the surface lines, will require some nice analysis and perhaps will be impracticable. It has been evident, however, from the first that the improvements, which included greater speed, more frequent cars, cleaner and better lighted cars, and, perhaps more important than all, a liberal system of transfers, would be sure to take away a considerable percentage of the Manhattan's business. This is in the nature of things and apart from any consideration of inadequate accommodation on the elevated. We have pointed out over and over again, in the discussion of these matters in the last few years, that short distance travel, which after all is the most valuable and far the greatest part of the business of any city system, will follow the lines of least resistance; that is, that people will take the cars that are handiest, other things being anywhere near equal. When one can find comfortable cars at the first street corner, passing at intervals of 30 seconds, he will not take the trouble to walk several blocks and climb a flight of stairs to get on an elevated train in order to make better time, unless he has a considerable distance to go. This rule will be found to apply just as forcibly to the new subterranean line, if it is built.

But it does not follow that the Manhattan Company has done the best that it could to hold its business and to increase it. In fact, if that company had pursued for the last half-dozen years a really enlightened policy, it is quite possible that the present rapid transit situation in New York would have been avoided. The simplest, the cheapest and the quickest way to improve the accommodations for long distance travel up and down the island, is by the development of the present elevated railroad system. Indeed, this is the only way which offers a fair prospect of a good return on the capital invested. The complete development of that system would include building certain additional lines, but a good beginning could be made by putting down more tracks on the streets already occupied so that express trains could be run; by improving the facilities for shifting at the termini and at various intermediate points, and by lengthening the platforms to permit six-car trains to be run.

In all of these matters the Manhattan Company and the city could have worked together to the great advantage of both parties. We are inclined to think that it is largely the fault of the Manhattan Company that the relations of these two parties have come to be such that it seems impossible now for them to work together, although the daily press has done a good deal of harm by ill-judged writing. The company has now taken certain steps which it might have taken long ago. It has introduced a transfer system at the lower end of the island, so that people can pass from the west to the east or the east to the west for one fare, which is a very obvious thing to do and will doubtless please quite a number of people—not a very great number, but a number that can make a good deal of noise. It has also increased the number of trains starting from intermediate points so as to give greater accommodations to people going up from the shopping districts. It has also been enabled by the completion of some additional tracks to increase its express train service. There still remain several things that it could do to add to the comfort and pleasure of the public. For instance, there is no reason in the world why its cars should not be brilliantly lighted at night. The additional expense would be slight and the effect on the public mind would be great. The policing of the stations and station stairs might be greatly improved at very little expense; and we are inclined to think that the personnel of the station and train service could be improved with decided advantage to the ultimate revenues of the company. The men are efficient in handling the passengers, but they are certainly not an agreeable lot to look at or to come in contact with.

We say these things with no disposition to underrate the ability with which the working of the road has been conducted. The executive head has done his part with wonderful skill and fidelity, and has made an enduring reputation among men who are competent to judge of his work; but there can be no doubt that he has been hampered by a singularly short-sighted and greedy directory. Of course it is impossible for him to say these things; we take the liberty, however, of saying them for him. We fear that the change of heart comes too late to prevent the carrying out of a policy which will be a mistake for the city and will be unfortunate for the Manhattan system.

Annual Reports.

Baltimore & Ohio.—The report of this company for the year ending June 30, 1894, has just appeared. The miles operated were 2,065. The principal results of operation follow:

	1894.	1893.	Dec. p. c.
Gross earnings	$22,502,662	$26,214,807	14.16
Operating expenses	15.560,689	19,041,982	18.28
Net from operation	6,941,973	7,172.825	3.22
Income from other sources	1,982,857	2,251,377	11.9
Available income (less net from Washington Branch).	8,719.830	9,210,666	5.3
Less interest, rents, etc	2,197,249	2,513,441	....

Dividends to the amount of $924,936 were paid in each of the last two years, and after paying the dividends, and something over $760,000 for retiring bonds, the balance left this year was $511,967, a decrease of $316,840 from the year before. It will be observed that in spite of the great loss in gross earnings (more than 14 per cent.), the heroic reduction in operating expenses (more than 18 per cent.) left but a slight loss in net. In fact, on the Main Stem where the gross earnings this year were near $11,000,000, and were a million and a half less than last year, there was a gain of about $15,000 in net earnings. On the Chicago Division, which earns about three millions gross, there was a gain of nearly a quarter of a million. Here the passenger gain must have been great. All other divisions of the road, however, showed loss in net as well as in gross, and the Wheeling, Pittsburg & Baltimore Division and the Straitsville Division showed deficits. The changes in the principal items of operating revenue are shown below:

	1894.	Decrease.	Decrease per cent.
Freight earnings	$13,916,476	$3,645,521	20.76
Passenger earnings	6,431,058	186,871	2.82

As was almost universally the case in the last year, the heaviest loss, both actual and relative, was in freight. A table of tons carried from 1884 to 1894 shows a progressive increase in each one of the 11 years (except 1885), up to 1893 when the total tons amounted to 16,356,405. In 1893 they dropped off to 13,357,175 or 18.34 per cent. The ton miles in 1894 were 2,160,919,472, being a loss of 19.8 per cent. The average rate per ton mile was 0.644 cent. as compared with 0.653 the year before. The President says that the decrease in tons carried is entirely in coal, coke, iron and lumber, but we do not find in the report any tabulation of the items of freight, therefore we cannot tell what the decrease was in any particular article.

The total passengers carried in 1894 were 9,626,928, a decrease of 12.13 per cent. from the preceding year; but the passenger miles increased 4.86 per cent., having been in the last year 419,859,886; that is, the average passenger journey was 43.73 miles and in 1893, 40.04. The average rate per passenger mile was 1.53 cents last year and 1.65 the year before. This, of course, is the old story of the World's Fair business—a decrease in local business, partly the result of hard times and partly because people spent their money going to the Fair, and a great increase in long distance business.

The net increase in the bonded debt for the year is $8,985,000. In this the principal item is the issue of $8,500,000 of 4½ per cent. 40-year bonds, classed as the Terminal loan. The proceeds, with the exception of the sum reserved for the completion of certain terminals, are being appropriated to the payment of the indebtedness of the company created in large part for the acquisition and construction of terminal facilities, of which the most important are in Philadelphia, the District of Columbia, Pittsburg, Brunswick, Cumberland and Benwood. This mortgage provides for the further issue of $6,500,000 to be expended in additional terminals, and it is believed that this will be sufficient for requirements of this nature for many years.

Notwithstanding the hard year, the company has spent $4,724,000 in maintenance of way and equipment, charged to operating expenses, and there has been charged to construction account $1,151,000. During the year 6,525 tons of 85-lb. rail was put in the track, mostly on the Philadelphia division, and the extensive improvements at Harper's Ferry were completed.

One subject of considerable interest referred to very lightly by the President, is that of the Staten Island Rapid Transit Railroad. The gross earnings on this road for the year 1894 were $1,031,373. There was a small falling off from the year before, but in the net earnings, which amounted to over $407,000, there was an increase. Speaking of the recent fight over the ferry between New York and Staten Island, the President says that the Staten Island Rapid Transit Railroad Company has formed, with the purchasers of the ferry franchise, the Staten Island Rapid Transit Ferry Company, and that it is believed that the contemplated plans in connection with this new organization will materially aid the Staten Island Rapid Transit Railroad in the development of Staten Island. He adds that the new passenger buildings and freight yards at St. George will now be undertaken and finished early next summer. We trust that this will happen, for the Staten Island property is capable of being developed into a very valuable one. All that is needed is the expenditure of considerable money. The story goes, however, that the purchase of the ferry franchise was part of a great scheme to introduce trolley lines on Staten Island, which would interfere materially with the business of the Rapid Transit railroad. If, however, a trolley system should be laid out there, which would not run along shore, but inland, it would doubtless speedily develop a new residence region and would add greatly to the revenues, not only of the ferry company, but of the present Rapid Transit railroad.

On the whole the Baltimore & Ohio seems to have come through a trying year very successfully, and the negotiation of its great loss of $8,500,000 was quite a triumph of good financial management.

The Anthracite Situation.

The anthracite coal trade is in a somewhat critical condition, and the causes of this condition, which are pretty complex, but which are not independent of the general trade, have gone on gathering force until they appear to have reached a climax. An attempt was made, when the panic was at its height, to conduct the affairs of the coal trade irrespective of general conditions. For a time it was successful, and comparatively high prices for coal were secured throughout the year 1893. However, the tension became too great, and in the spring of this year the bottom apparently fell out of the market. Stove coal sold as low as $3 a ton in midsummer and even at that figure there was little demand. The leading producing interests attempted to better the situation by agreeing each month to restrict production. The verbal contracts, however, were regularly broken, and as a result there was constantly pressing upon the market more coal than it could absorb even at the low prices. An attempt was made late in October to profit by the expected winter demand which is usually felt in November. The managers decided to advance their price on stove coal some 75 to 90 cents, making it $4 a ton, and at the same time to continue unrestricted production. The public thought that the two elements were incompatible; but the result was an advance in the price of coal at points not on tidewater, that is, the "line trade." This business is largely non-competitive and the various shipping interests were able to get the high price. In the tidewater markets no attempt was made to advance the price, and it is doubtful if such an attempt could have succeeded for all the shippers reached tidewater with their coal.

However, up to a point the plan worked. About thirty per cent. of the anthracite coal output is produced by individual operators who do not control shipping facilities. With few exceptions these operators have contracts with the carriers whereby they sell their output at the mines for

(0 per cent. of the tidewater price. These operators have been receiving $2 a ton or less for their coal, stove size, at the mines. It has been sold either in tidewater markets, or as the case might be, at line points. If it went to the line trade, it brought some $4 a ton as against say $3.25, the rate on which it was purchased. Sixty per cent. of the difference, or some 45 cents, was a clean gain to the carriers. On the other hand, if it was sold in the tidewater market, the line trade, with its higher prices, was reserved for the carrier who had coal of his own to sell.

This discrimination was the basis of the resolution adopted by the Anthracite Coal Operators' Association last week, requesting Lehigh Valley to make one price for coal to all points. The membership of the Association is composed of shippers over the various lines, and the Lehigh Valley was selected to inaugurate the new policy because about 52 per cent. of its coal is mined by individuals. Coincidently with this action Coxe Bros. & Co., Limited, announced that hereafter it would make one price to all points whether they be at tidewater or on the line. This company produces about 2,000,000, tons of coal per annum and its action carries much more weight than that of the Operators' Association, as it is entirely independent. The position of the Association is weakened by the fact that most of the coal produced is covered by contracts which have considerable time to run and which cannot be abrogated. The only redress which the operators have, provided the carriers do not yield, is to close down.

There seems to have been a feeling in the carrying interest that it would be forced into compliance with the demands of the operators and to either advance the tidewater price (at this time impossible) or to lower the line price, which would cut down revenue very seriously, as perhaps 60 per cent. of the total business is transacted outside of tidewater markets.

But at last accounts the idea seems to prevail that if Coxe Bros. & Co. can be managed, the other independent operators can be ignored, owing to existing contracts. However, the carrying companies admit that the situation is very grave; that winter buyers have been driven from the market; that the tendency is to weaker prices and that some of the companies cannot live if they are not forced to sell coal below $3 a ton.

October Accidents.

Our record of train accidents in October, given in this number, includes 92 collisions, 81 derailments and 9 other accidents, a total of 182 accidents, in which 44 persons were killed and 209 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	18	0	0	18
Misplaced switch	0	2	5	7
Failure to give or observe signal	4	0	0	4
Mistake in giving or understanding orders	0	2	1	3
Miscellaneous	12	3	9	24
Unexplained	10	7	19	36
Total	44	14	34	92

DERAILMENTS:			
Broken rail	1	Careless running	1
Loose or spread rail	6	Bad switching	1
Defective bridge	2	Bad loading	3
Defective switch	1	Derailing switch	1
Defective frog	1	Open draw	1
Broken wheel	2	Animals on track	6
Broken axle	2	Landslide	2
Broken truck	2	Wind	1
Fallen brakebeam	3	Malicious obstruction	6
Broken drawbar	2	Accidental obstruction	1
Too quick application of brakes	1	Unexplained	31
Misplaced switch	4	Total	81

OTHER ACCIDENTS:		
Boiler explosion	1	
Broken side rod	3	
Cars burned while running	2	
Other causes	3	
		9
Total number of accidents		182

A general classification shows:

	Collisions.	Derailments.	Other ac'd'ts.	Total.	p.c.
Defects of road	0	11	0	11	6
Defects of equipment	19	12	4	35	20
Negligence in operating	37	11	2	50	27
Unforeseen obstructions	0	16	3	19	10
Unexplained	36	31	0	67	37
Total	92	81	9	182	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other ac'd'ts.	Total.
Passenger	34	23	8	65
Freight and other	128	59	1	188
Total	162	82	9	253

The casualties may be divided as follows:

KILLED:	Collisions.	Derailments.	Other ac'd'ts.	Total.
Employees	11	12	2	25
Passengers	0	4	0	4
Others	7	8	0	15
Total	18	24	2	44
INJURED:				
Employees	65	39	3	107
Passengers	31	64	0	95
Others	2	5	0	7
Total	98	108	3	209

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	1	0	1	8
Defects of equipment	0	0	2	3
Negligence in operating	0	34	11	69
Unforeseen obstructions and maliciousness	0	42	3	16
Unexplained	3	19	8	11
Total	4	95	25	107

Twenty-five accidents caused the death of one or more persons each, and 42 caused injury but not death, leaving 115 (63 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with October of the previous five years shows:

	1894.	1893.	1892.	1891.	1890.	1889.
Collisions	92	132	96	120	152	112
Derailments	81	116	94	91	115	70
Other accidents	9	12	6	13	16	8
Total "	182	260	196	224	283	190
Employees killed	25	45	47	42	71	43
Others killed	19	52	15	16	17	8
Employes injured	107	140	83	100	204	133
Others injured	102	188	79	79	176	91
Passenger trains involved	65	99	62	67	97	73
Average per day:						
Accidents	5.87	8.39	6.32	7.23	9.33	6.13
Killed	1.42	3.13	2.00	1.87	2.84	1.65
Injured	6.74	10.58	5.23	5.77	12.26	7.23
Average per accident:						
Killed	0.242	0.373	0.316	0.259	0.311	0.268
Injured	1.148	1.261	0.827	0.799	1.343	1.179

October, 1893, was one of the three months in which occurred the terrible series of train accidents which called the attention of the whole world to American railroads, and the present record, therefore, presents a favorable comparison, but it is bad enough. It will be seen that the number of persons killed, other than employees, is larger than in the same month in any one of the four years previous to 1893, though it is fair to note that the chief cause of the increase in this item is the large number of tramps voluntarily putting themselves in places of danger.

Of the four passengers killed in October two are classed under unexplained accidents. The derailment at Oakland, Cal., on the 2d, was attributed by some to the mistake of a tower man in turning a derailing switch under the train, but we have not learned whether there is a fair basis for this theory. The disaster at Coosa Valley, Ala., on the 5th, seems to have been due to a disgraceful bridge failure.

Perhaps the most notable train accident of the month was that at Vance's, Tennessee, on the 7th, but the passengers got off with great good fortune, for which, it appears, the vestibules are to be credited. At Boston, on the 23d, there was a collision of passenger trains in which, according to the local accounts, "it was miraculous that no one was injured." In other words, if either train had been a second or two earlier, cars loaded with passengers would have been wrecked. This collision is noteworthy from the fact that although on a four-track road, where the passenger business is very heavy, it was occasioned by the existence of a facing point crossover track, unprovided with distant signals. Not only this, but it seems that there were no signals of any kind, except low switch targets, and no detector bars.

Derailments by malicious obstructions continue numerous. A notable instance was that at Tomahawk Junction, Wis., on the 7th. It is reported that one of the men who sawed the timbers of the trestle at this place has been caught and has made a confession.

At St. Louis, on the 4th, a freight train of the Wabash road wrecked an electric street car at a crossing, badly injuring six of its occupants, three probably fatally. At Edge Moor, Del., on the 2d, a passenger train struck and wrecked a large wagon containing a ton of gunpowder, and the driver was badly injured, but the powder did not explode, although the cars were spilled. At Lebanon, Ind., on the 28th, five persons were killed in a wagon on a crossing, and at Buffalo, on the 14th, three were similarly killed at a single stroke. At Pittsburgh, on the 23d, a violent collision of electric street cars in a dense fog wrecked both cars and injured a number of passengers, one of whom, a prominent citizen, was believed to be fatally hurt.

The successful suit of the Cleveland Car Service Association against a consignee who refused to pay demurrage at Akron, O., was briefly noticed in the *Railroad Gazette* of Oct. 19, page 730. A correspondent has since sent us a more accurate account of the case from which we copy the following head notes:

1. It is reasonable that a railroad company should have some rule as to when freight should be removed from its cars; and forty-eight hours would seem to be a reasonable time within which to make the removal.
2. An express contract made between a shipper of freight and a railroad company by the terms of which the shipper agrees to remove the freight within forty eight hours after notice of its arrival at its destination, or pay a reasonable compensation for the detention of the cars is not against public policy and in the absence of fraud both parties are bound by its terms.
3. A shipper who signs such a contract under which freight is received by a common carrier is bound by its terms although the contract was not read by him and he failed to know its contents.
4. The fact that important conditions of the contract are written or printed after the signature and on an opposite page does not vary the rule where there is an express reference to such conditions on the face of the contract above the signature.

The point on which the consignee chiefly based his confidence does not appear in the foregoing syllabus. He was unable to identify the car of lumber with any thing that he had ordered, and so refused it and requested the station agent to telegraph for the shipper's name. This was done, but the answer was either wrong or misread and the consignee was still in the dark, so that he persisted in his refusal to take the freight. His error, leading him to defend the suit of the road, was in supposing that this gratuitious action of the freight agent affected the responsibility of the road. But this claim seems to have been swept aside by the judge with little ceremony. Probably the agent followed a recognized custom in thus accommodating the consignee, but it is a pernicious custom, and it is a great pity that it cannot be abolished. It is a trifling matter, sending a telegram so as to save a customer a few cents, but customers ought to be above making such petty requests and railroads ought to be able to compete with one another without giving gratuities. It is too much to hope for, of course; we shall have to wait for that millenial time when the government runs the railroads. A circumstance in this case, peculiar, it seems to us, was that the shipper signed the shipping order which he delivered to the road with the car, thus agreeing to its conditions. Probably this made the victory easy for the railroads, for if the counsel had had a chance to argue to their hearts' content as to whether the shipper had read the conditions on the bill of lading and had freely consented to them, probably they would be talking in court now. Evidently the Cleveland, Canton & Southern has some sleight-of-hand arrangement by which it secures signature in cases like this. Certainly such practice is not common. An agent generally deems himself fortunate if he gets a properly prepared shipping order filled out by the shipper's clerk and not signed.

The Wisconsin Central has lately adopted the plan of charging for meals in its dining cars by the card instead of at a fixed rate per meal. This custom seems to be growing in favor. On the Lehigh Valley, where it has been in vogue about nine months, the average amount paid by each customer is now about 72½ cents. This is less than three-fourths the old price, and the plan must be a drawing card, as probably nine persons out of ten get just as satisfactory a meal as they did before. The officers of the road express great satisfaction with the plan. They say that the cost of maintaining the service at a high standard is less than under the old plan, and that the passengers seem to like it universally. We understand that the cars on this road are self supporting; there is less waste of material and less risk. Passengers who formerly were in the habit of carrying a luncheon, now patronize the cars. The business is increased by serving meals at all hours, and dining cars are now run through from Easton to Niagara Falls. The Lehigh Valley people also express satisfaction with their lunch-counter car, which was fitted up last summer and was run upon excursion trains. This car was generally run in the middle of the train, and it was both a convenience for the passengers and profitable to the road. On a train of ten cars this arrangement would lead to a good deal of walking to and fro by the passengers, but if the platforms were made safe by suitable gates there would probably be no great objection to it.

From time to time we have published the news of the "adhering" of one American railroad after another to the International Railroad Congress, the next meeting of which is to take place in London next summer. It may, however, be a matter of interest to collect the list up to date. The railroads and systems are: American Railway Association, as an association; the Pennsylvania Railroad (has belonged to the Congress for a number of years); the New York, New Haven & Hartford, the Chesapeake & Ohio, the Richmond, Fredericksburg & Potomac, the Denver & Rio Grande and the Louisville & Nashville. Probably the New York Central should be added to this list. It was the intention of some of the superior officers to join last spring, but through an oversight it appears that some of the formalities have been neglected. This will probably be corrected at once.

NEW PUBLICATIONS.

General Specifications for Roofs and Iron Bridges. By Charles Evan Fowler, Assoc. M. Am. Soc. C. E., Chief Engineer Youngstown Bridge Co. Second edition, revised and enlarged. Published by the author at Youngstown, O. Price, 25 cents.

A considerable demand for the first edition of these specifications, from engineers and architects in the United States and in foreign countries, has induced the author to publish this second edition, which seems to be complete, sound and remarkably well arranged. The subject of each paragraph is indicated by sub-headings on the left hand margin, and cross references from one paragraph to another are made by numbers on the right hand margin and a complete alphabetical index is appended. Special data are given for snow loads in different parts of the United States, being given in pounds per square foot for various pitches of roof; wind pressure in pounds per square foot, vertical, horizontal and normal is given for various pitches also. Formulæ are given for calculating specifications for roof trusses, and there are specifications for purlins carrying corrugated iron, special specifications for bending in columns; steel specifications for soft and medium grades, also specifications for wrought iron; requirements for ventilators and louvres and for lighting. These are a few of the special items covered. In fact regard has been paid to many details not ordinarily considered in specifications of this kind, and Mr. Fowler tells us that his specifications are used in the regular course of study in a number of colleges.

The Pennsylvania Railroad Company at the World's Co-

lumbian Exposition at Chicago, 1893.—The Pennsylvania Railroad Company has issued a very handsome catalogue of its exhibit at the World's Fair. Of the exhibit itself it is not necessary for us to say anything now, for our readers well remember what an admirably conceived and executed project it was. It was organized and directed by Mr. Ely, aided chiefly in the detail work by Mr. J. Elfreth Watkins, who was special agent in charge of the exhibit.

The catalogue now published is a square, quarto volume of 182 pages, printed on heavy calendered paper with handsome margins and admirably bound. A great many engravings, chiefly from half-tone plates, are given of the objects and models that were exhibited. A complete catalogue usefully annotated is also given. As the history of the system goes back to the early days of railroading, and as its development has gone on concurrently with the growth of the railroads of the world, this volume, which has been so carefully and intelligently compiled, becomes a great deal more than a mere advertising scheme; it is a substantial addition to railroad history.

The exhibit itself, which was collected with so much pains and expense, is also preserved, we are glad to say, and will stand, we trust, for many generations, as a substantial aid to the historian and student. It was given immediately after the close of the World's Fair to the Field Columbian Museum at Chicago, and is now installed there, in Halls 41 and 57 in the east pavilion of the Museum Building at Jackson Park.

Directory of the Street Railway Companies in the United States and Canada. New York: John N. Reynolds, 140 Nassau street.

Mr. Reynolds has arranged in pocket book form a convenient list of street railroads in the United States and Canada. The towns are given alphabetically, and under each town is the name of the street railroad or railroads in that town; and under each name are gage, weight and kind of rail, mileage, number of cars and horses, other motive power, and names and addresses of the principal officers. The fact that the information is cut down to these few essentials makes the list compact, and the convenience of the user is still further served by marginal lettering, so that the name given can be quickly found under its own letter.

Canal Traffic in France.

Mr. Hardinge a Secretary in the British Embassy at Paris, reports that there are 7,747 miles of rivers and canals open to navigation in France. Of this, 3,003 miles are canals and 4,744 miles are rivers or lakes; 536 miles are managed by Concessionaries, the rest by the state. The costs of this system have been as below, in francs:

1814–30	149,176,329
1831–47	341,246,125
1848–51	37,792,039
1852–70	238,791 789
1871–78	127.641,355
1879–91	515,971 538
	1,410,622,175

In 1880 the navigation dues, which had amounted to an annual sum of from 3,500,000 to 4,500,000 francs, were abolished. In 1879 a law divided all waterways into two classes, viz.: principal and secondary lines. On the principal lines the locks are 126x17 ft., in plan, with 6¼ ft. on the metre sills. In 1878 there were but 912 miles with locks of this size; in 1892 there were 2,562 miles.

Thanks to these improvements, made since 1879 a great impetus has been given to the carrying trade by inland waters. During this time the tonnage by canals has increased by 67 per cent., as against an increase of 16 per cent. by rail. The goods carried by water are naturally low-priced commodities; 32 per cent. were building materials and 28 per cent. mineral combustibles. Over one-half of the boats, 8,460 out of 15,925, are worked by their owners. Since 1880, when the freight on coal for long distances averaged about 2½ centimes, say 5 mills per ton-kilometre, the average charge has fallen to 1½ centimes—3 mills. This represents an annual saving of 35,000,000 francs, $6,255,000.

As Professor Cohn has lately made an attack on the canals of Germany in the *Economic Journal* of London, saying in effect that the development of inland navigation in Germany has been to the benefit of the larger firms and compels the great mass of taxpayers to make sacrifices in the interest of the wealthy minority; it is of interest to see that Mr. Hardinge says, in effect, that the development of canal traffic has not been much to the benefit of the owners of barges, who are obliged to content themselves with modest profits owing to the keenness of competition. Thus producers and consumers have been those who have profited most.

Foreign Railroad Notes.

The Greek Ministry of Public Works reports in that country 568 miles of railroad in operation, 304 under construction, and 214 more chartered. Of these, 272 miles are of standard gage, 804 of meter gage, 80 of 30 in. and 11 of 24 in. gage, which makes quite a menagerie for a little country like Greece. But all the road actually in operation is of meter gage, except 55 miles of standard gage.

The completed 160 miles at the western end of the Siberian Railroad earned at the rate of $395 per day during the three winter months, or at the rate of $72 per mile per month.

St. Petersburg newspapers publish a rumor that the Government will require that all regular officers and employees of the State railroads must retire on reaching their 55th year—just when a man has fairly learned his business! And, further, it is said that the regulation will be imposed upon the private railroads shortly. Evidently the boys are getting the upper hand in Russia—or else the Russian papers emulate some American ones in the manufacture of news.

There is a great scarcity of engineers on the Siberian Railroad, and Russian newspapers say that in spite of this the young men who completed their course in the national engineering shool this year were, with very few exceptions, unwilling to accept appointments in Siberia. In consequence of this, the Ministry has ordered that 60 of the graduates of a lower school shall be received for one year in the engineering school, and then receive the rank of engineer of roads on condition of serving not less than three years on the Siberian Railroad.

St. Petersburg newspapers report that the Minister of Finance proposes that the issue of free passes on the Russian railroads be totally abolished after Nov. 30 of this year, even railroad officers and employees to be required to pay their fare.

The Russian Minister of Transportation long ago issued regulation, concerning the carriage of live stock which have been, it is said, notoriously neglected. Recently he issued them again and added a warning that he would not be content with a "paper" observance of them—the more issue of the rules to the employees—but if they should not be observed hereafter he would know the reason why.

Preliminary studies are being made by the Russian authorities for two railroads in Turkestan, in the district which seems to have been the birthplace of nations, whence hordes of nomads in past ages have descended upon most parts of the old world. One of these lines is projected from Samarkand northward and eastward to Aidishan, almost at the foot of the Pamir, the "roof of the world," with a branch to Tashkend. The lines would penetrate some fertile irrigated country which produces cotton, though the country is in the latitude of New York and is 1,500 to 2,500 ft. above the sea in the valleys. The Russians think they might get a large part of their cotton supply thence.

They are letting some very pretty contracts for rolling stock for the Siberian Railroad. At a recent meeting of the Commission in charge of the matter appropriations of more than $10,000,000 for this purpose were approved. These appropriations exceed by but $300,000 the orginal estimates.

A great reduction in passenger rates having been decided upon in Russia, the Minister of Transportation immediately called a conference of the officers of all railroads to agree upon measures for reducing expenses. The steps agreed upon were: To stop running first-class cars on some routes; to discontinue running third-class cars on express trains (the others run not more than 21 miles an hour); to reduce the train crews where automatic brakes are provided; and do away with signal cords on the same trains; and finally to discontinue the exchange of stoves for steam and hot water heaters in third-class cars. It seems to have been taken for granted that travel would not increase enough to make up for the reduction in fares.

The work of increasing the capacity of the freight cars of Russian railroads from 600 to 750 poods each (21,600 to 27,000 lbs.) will soon be completed. The change was effected in most cases simply by strengthening the springs.

Portugal has granted a charter for a railroad in its West Africa possession, Benguela, from Lobito Bay, a little north of Benguela, about 190 miles to Chaconda, in the interior. Trains of carriers now conduct a considerable traffic between Benguela and the country on the upper Zambesi, so that as many as 15,000 such carriers are sometimes camped in the vicinity of Benguela. Another charter has been granted from Mossamedes, a coast town some 180 miles south of Benguela, up the Bero River to the foothills of the Chella plateau, a fertile and healthy district believed to be fit for a Portuguese colony.

The Congo Railroad has cost so much more than was expected that the company contemplated issuing bonds on hard terms, when the Belgian Government, which is the chief stockholder, agreed to come to the rescue with a subscription for 8,000 additional preferred and 12,000 common shares, for which it pays 10,000,000 francs. The company has now 44 miles of road completed, at a cost of $62,000 per mile, which is just double the original estimate. With the new capital it is hoped to extend the road 65 miles, and reach a thickly peopled country where an important trade by caravans already exists. A further yearly extension of 31 miles is contemplated, which would finish the road in 1900.

On the steep Brenner Railroad, in Austria, last summer, 10 loaded gravel cars started down a steep grade and got under such headway that they ran from Franzensfeste to Brixen in 2 minutes, though the express train takes 14 minutes between those stations. To stop these cars a station agent dispatched a locomotive, whose engineman and fireman volunteered for the occasion, which was put in the way of the descending cars and threw them from the track in ruins, getting pretty well battered itself, but saving a freight train which otherwise would have been struck. The three employés concerned were decorated by the Emperor.

At the beginning of this year the total length of the railroads in Austria was 9,918 miles, with 76 different proprietors, among which were five different governments, adjacent states having short sections of lines on Austrian territory.

A reduction of 28 per cent. has been made in the rates on iron shipped in car loads from Austria to its Adriatic port, Trieste, doubtless to facilitate exportation to compete with shipments over the Hungarian railroads to Fiume. The rate is 8 cents per 100 lbs. from Vienna.

The European international time convention, which held its meeting for adjusting summer time tables in Paris, last June, will arrange the winter time tables in Florence Dec. 12 and 13 next. The attendants seem to have an extraordinarily good time wherever they go, but it is ony recently that meetings have been held so far from Central Europe. Now, however, the convention seems to be making a tour through the most interesting European cities.

TECHNICAL.

Manufacturing and Business.

The Kellogg Steel & Iron Co., of Buffalo, has been incorporated to design and construct bridges, buildings and other structures of iron or steel. Capital, $5,000, and directors, Thomas H. Brooks, of Cleveland, O., and Charles H. Kellogg and Peter C. Newkirk, of Buffalo.

A Russell snow-plow, manufactured by the Ensign Manufacturing Co., of Huntington, W. Va., has been purchased by the Somerset Railroad, of Maine. The plow is about 34 ft. in length, weighing over 23 tons.

The Barney & Smith Car Co., of Dayton, O., has declared the regular two per cent. quarterly dividend on the preferred stock, payable Dec. 1.

The Foster Engineering Co., of Newark, N. J., has an order from the Messrs. Cramp & Sons for the equipment of the American liner "St. Louis," with Foster pressure regulators. The order for immediate requirements includes six 8-inch valves, the largest the Foster Co. has ever made for steamship service, eight 5-inch valves and others of smaller sizes.

The Brady Metal Co., 115 Broadway, New York, is pushing a bearing metal known as the Magnus metal, which is comparatively new, but is showing excellent results. One competitive test on a trunk line showed an average of 3,941 miles to the ounce of wear. The Brady self-fitting, lead-lined bearings are now in use on six of the principal Eastern railroads and no complaint has yet been recorded against them. The company also does a good deal in furnishing bearings and other material for electric railroads and for street car lines in general. It has a foundry capacity of a thousand bearings and 10,000 lbs. of engine metal per day. The company will make monthly or yearly contracts at fixed prices and will undertake to do all work of this sort at a saving over the present outlay.

Harry G. Runkle, as Receiver of the Kinsman Block System Co., will sell the property of that concern, including the patents issued to Frank E. Kinsman, controlled by the company, at Plainfield, N. J., on Dec. 21.

New Stations and Shops.

Ground was broken by the Baltimore & Ohio last week for the erection of shops at Zanesville, O., to do general repair work, giving employment to 200 men.

In the annual report of the President of the Baltimore & Ohio Railroad the statement is made that the new passenger buildings and freight yards at St. George on Staten Island will be undertaken and finished early next summer. This project has been on hand for some years and postponed because of the financial condition of the company.

Street Car Heating.

The Consolidated Car-Heating Co., Albany, N. Y., has received this week an order from the People's Traction Co., Philadelphia, for the equipment of 300 cars with its system of electric heating. Other large orders recently received by the Consolidated Company are: 149 car equipments for the West End Railway, Boston; 187 for the Union Railroad, Providence; 60 for the Nassau Road, Brooklyn, and many other smaller orders, aggregating in all about 500 car equipments. The heater is now in use in 100 cities and towns in the United States and Canada and on over 1,300 cars.

Interlocking.

The National Switch & Signal Co. has just closed another contract with the Chicago, Milwaukee & St. Paul road, through Mr. Geo. Gibbs, mechanical engineer, for an interlocking plant to be erected at Grayland, Ill., to protect an electric street car crossing with the Gibbs system.

The Wear of Brasses.

It has been repeatedly shown that there is a saving in the

running expenses of cars and locomotives when the best materials are used for axles, brasses, waste and oil. In the matter of brass the question resolves itself into so much brass for so many miles, due regard being paid to the wear of the brass on the axle and to the coefficient of friction between the two. But while these items should receive the attention of the officer charged with the selection of materials, they are too complex to enter into the accounting, so we usually have presented the gross result of a certain number of miles per ounce of wear. Information regarding the mileage per ounce of wear of brasses in car service is scanty, and even where accurate records are kept, the modifying elements of the service, the condition of the roadbed and the kind of ballast should be considered. As a rough estimate the statement may be made that from 3,000 to 3,500 miles per ounce of wear is good service, although there are records of mileages far in excess of this. Indeed, we know of Magnus metal bearings with a record of more than 150,000 miles to their credit; and other instances where car brasses have shown nearly 5,000 miles to the ounce of wear. When a 60,000 lbs. capacity car is light the pressure per square inch of bearing surface is about 100 lbs., whereas when fully loaded it rises to about 350 lbs. But the car gets credit for mileage both empty and loaded, and if the wear is proportional to the weight on the brass, and half the mileage is made loaded and half empty, we find that the mileage of 3,500 per ounce of wear for a car brass would be reduced to 2,250 miles per loaded car-mile, and it was a comparison like this that probably induced the late Mr. J. N. Lauder to put the mileage per ounce of wear at 1,200 miles.

It is in engine service that a brass receives the most even wear; the load practically never varies and a mileage in locomotive service is subject to a smaller discount for dust, inequalities of load and lack of care than in car service. A recent test on a trunk line under a 70-ton engine showed that Magnus brass ran 3,194 miles per ounce of wear.

THE SCRAP HEAP.

Notes.

The New Jersey Court of Appeals this week set aside a verdict in which the Pennsylvania Railroad Co. had been held liable for the death of a man killed at Rahway by a mail bag thrown out of a car by a mail agent. It appears that a notice enjoining caution in throwing out bags was issued jointly by the superintendent of the railroad and the superintendent of the mail service and was addressed to both baggage men and mail agents; and the verdict against the road was based on the absurd assumption that this rule placed upon baggage men the duty of supervising mail agents in this matter. According to the press reports the Judge in the lower court adopted this rule.

The newspapers print extracts from a letter from Colon stating that large numbers of skilled workmen who went to the Isthmus to get work, when it was announced that the Panama Canal was to be revived, are now in danger of starvation, being extremely destitute. The letter states that there is no work except for laborers at about 31 cents a day (70 cents in Colombian silver).

The carpenters in the car shops of the Philadelphia & Reading, at Reading, now work on the piece work plan.

The officers of the Old Colony road who were imprisoned about two weeks ago are still in the Plymouth jail. The efforts of the officers of the road to secure a pardon from the Governor seem to be hampered by many delays, although a petition has been signed by many prominent citizens. It is said that all but one of the Directors of the electric street railroad, which Sanborn and his men were fighting, will favor the petition. On the other hand, the Old Colony Congregational Club has passed resolutions approving the action of the Judge and of the District Attorney. The latter, it is said, will appear before the Governor and oppose the issue of a pardon.

The Toronto, Mail says: "We are not flush of money just now, and it has yet to be shown that Hudson's Bay is a fit highway for trade. If navigation is possible and safe over a sufficiently long season for moving in and out, the chief annual imports and exports of the west, it does not follow that a road running to the bay would pay interest on the capital invested. It would require other business than foreign trade to keep it in operation for more than a third of the year. The interior demand would not keep the road going. We have recently spent a goodly sum to improve the water ways to the west. If the St. Lawrence were made navigable for ocean vessels there would probably be an end to transportation on the Hudson's Bay Railroad, and the moneys sunk in that enterprise would be lost. Doubtless this is thought of by the British investors. They are sure at all events that the opening of the road would lead to a drop in rates by other routes. They could balance matters by raising the rates when the bay is closed. The Hudson Bay line could not."

In the Joliet side-track case, Judge Grosscup dismissed the case with the recommendation that the city authorities and the Receivers of the Atchison get together and effect a compromise. The officers of the road now express a willingness to elevate the tracks if the city will meet them half way and depress the streets somewhat and divide the cost.

The Buffalo grade crossing Commissioners tell the newspapers that they are very much discouraged about the separation of grades in that city. The subject was discussed for several years in an attempt to procure an agreement between the different railroad companies; finally the New York Central, whose lines are to a large extent separate from those of the other companies, agreed to a modified plan presented by the city, and a few months ago it was said that the contract between the city and that company for actual work would be signed at once, but it now appears that the signatures have never yet been affixed and that the railroad still has reasons for desiring delay to which it will tenaciously hold.

The question of abolishing eight important grade crossings in Northampton, Mass., has finally been settled, the city and the two railroads, the Boston & Maine and the New York, New Haven & Hartford, having agreed upon a plan which will cost about $750,000. This includes a new Union passenger station to cost $60,000. The plans will now go to the special commission, under the law, and it is expected that work will begin next spring.

Connecticut papers report that a new Union passenger station is to be built at Waterbury to cost $25,000. Improvements at this point have been needed for a long time and have been delayed by the consideration of plans for more extensive alterations, but it is said that important changes of grade which were proposed have now been abandoned on account of the great expense.

Southern papers report that the Southern Railway & Steamship Association has reduced the minimum car load weight on a large number of commodities from 15 tons to 12; and the minimum charge on a single shipment is to be 25 cents, instead of the price on 100 lbs. first-class.

Train Robbers.

A train of the Missouri, Kansas & Texas was stopped by robbers at a side track 11 miles south of Wagoner, I. T., on the night of Nov. 13, and the passengers robbed. The engineer and fireman ran into the woods as soon as they had stopped the train and the robbers tried unsuccessfully to force open the express car by the use of dynamite. Two masked men stopped train No. 1 on the St. Louis & San Francisco Nov. 12, at Verona, Mo., and compelled the express messenger to give up packages estimated to contain $400. There was an attempt to rob passenger train No. 5, on the Yazoo & Mississippi Valley, at Panther Burn, 200 miles south of Memphis, on Nov. 18. When the engineer noticed a red light ahead, instead of obeying he pulled out the throttle, but a party of six unmasked men opened fire with their revolvers. Fireman Cole's right arm was fractured.

Train Wrecker to be Hung.

Worden, one of the strikers convicted of complicity in wrecking a train near Sacramento, Cal., July 11, during the strike, has been convicted of murder in the first degree and sentenced to be hung on Feb. 12. The engineer and four United States soldiers were killed in the wreck. Two train robbers pleaded guilty to the charge of murder in the first degree at Waukegan, Ill., on Nov. 14.

Electric Railroad between Narragansett Pier and Watch Hill.

A plan is proposed to build an electric railroad along the Rhode Island shore to connect the summer resorts of Narragansett Pier and Watch Hill. During the past year an electric trolley railroad was operated from a point opposite Watch Hill to Westerly, R. I., and its success has brought up again the old project for a railroad connecting these two summer resorts. There would seem to be a very good likelihood of securing a large and profitable traffic for this line during the summer excursion season which begins early at both these places and lasts until late in the fall. At Watch Hill there is steamer connection with New London and at Narragansett Pier with Newport. The plan for the railroad between these points is a very old project. About 20 years ago such a plan was talked of, the proposition then being to build a narrow gage steam railroad. The projector of this line was Ira H. Palmer, of Stonington, Conn., who interested the late Vice-President Reed, of the New York, New Haven & Hartford, and Charles Pond, of Hartford, in the scheme. These gentlemen gave much attention to the project and they decided upon a location which kept in sight of the shore the entire distance but was high enough above the water to avoid damage to the roadway by storms in winter. Mr. Reed estimated the cost of the line at $200,000, but finally the plan was given up, chiefly on account of the financial failure of one of the projectors.

South American Notes.

There are now open to traffic in the state of Rio de Janeiro 1,156 miles of railroad; 69 miles are under construction, and 310 miles are under survey.

The gross receipts of the São Paulo (Brazilian) Railroad for the first half of the present year amounted to 4,701,690 mil reis, as against 5,294,900 mil reis in the corresponding period of 1893 (the mil reis having fluctuated from about 15 cents to 21 cents, standing now at 23⅞ cents). This falling off is attributed chiefly to the shortage in the coffee crop of 1893-4.

The navigation of the upper reaches of the great Brazilian River São Francisco is at last a fact. Steamers are now running between Joãozeixo and Paxauna, a distance of 1,006 miles. Steamers now ply 550 miles in the state of Bahia, and other steamers are soon to be put in service. The exports from the valley of the São Francisco (rubber, tobacco, coffee, sugar and hides) have in consequence increased enormously.

The recent sale of government nitrate properties in Chili realized $5,400,000, being $935,000 in excess of the official valuation. It is stated that of the capital invested in these purchases $2,000,000 came from Chilian sources. The official valuation of the remaining properties to be sold is $5,000,000. A bill has been drafted by the Chilian government for presentation to Congress, authorizing the purchase by the state of that part of the Trans-Andine Railroad already constructed, payment to be made in bonds bearing 5 per cent.

Negotiations are in progress between the Nitrate Railways Co. and the Chilian government looking toward an arrangement for extending the company's lines to Bolivia.

The annual report of Sr. J. M. Sarrano, general manager of the Ferro-Carril de Antofagasta (commonly known as the Antofagasta & Bolivia Railroad) shows a continued improvement in the business of this remarkable line during 1893. The original, or main line, from Antofagasta, Chili, to Uyuni, Bolivia, is 379 miles in length. During the year 1893 an extension northwards to Oruro, 195 miles, was opened to traffic, making a total mileage of 574. The gross receipts on the main line amounted to $4,691,163, of which $4,541,636 was from freight. The expenses were $3,290,325, or 59.43 per cent. of the receipts. The net earnings were $2,246,064. The freight movement amounted to 380,561 tons, of which 310,518 tons were from the interior of the coast, consisting chiefly of ores of silver and tin, with some antimony. This traffic has been handled with light rolling stock, over a single track of only 28 inches gage.

The report of the Buenos Ayres Western Railroad, Argentina, for the year ending June 30, 1894, shows a net profit available for dividends, of $390,000.

The Argentine government has approved the plans of the Buenos Ayres & Rosario Railroad for renewing the bridges on that line to Campana.

The report of the Argentine Minister of the Interior, recently presented to Congress, shows that there were only 156 miles of new track laid in the republic during the past year, the total length of railroads of all classes being 8,656 miles, being an average of 19.2 miles for every 10,000 inhabitants. The total capital invested in railroads amounts to $436,422,437. The total earnings were, for the year 1893, $66,764,670, and working expenses amounted to $39,420,109, leaving a net profit of $27,347,561. The total losses sustained were $94,563 by Government lines, and $1,124,448 by private guaranteed lines. The total traffic movement was 12,969,145 passengers, 6,295,992 tons of freight, and 64,094 tons of baggage, being an increase over the previous year of 1 381,566 passengers, 898,632 tons of freight, and 6,870 tons of baggage.

Returns from the Argentine railroads for the first half of 1894 show a considerable increase of earnings over those for the same period of 1893, being most marked in the cases of the Buenos Ayres Western and the Entre Rios lines. There have been no political disturbances in the republic, crops have been good, but the gold premium has continued to be a disturbing factor, fluctuating from 229 at the beginning of the year, to 267 on June 30. The folowing table sets forth the results of operation for the leading unguaranteed roads:

	Miles Open.	Train Mileage.	Receipts per Train Mile.	Expenses per Train Mile.
Buenos Ayres Great Southern..	1,398	1,120,423	$2 34	$0 87
Buenos Ayres Western.....	403	655,633	2 09½	0 97½
Buenos Ayres & Rosario.....	911	889,810	1 72	0 82
Central Argentine.....	746	1,034,528	1 70	0 96
Entre Rios.....	379	146,099	1 43½	0 95

The Brazilian state of Amazonas is said to be about to subsidize a new line of steamers from Manáos (1,000 miles up the River Amazon) to Mediterranean ports, touching at the Azores. This would be the fourth line of steamships from Manáos to foreign ports, not including the Brazilian line from Rio de Janeiro.

New York Canals to Close on Nov. 30.

Superintendent Hannan, of the Department of Public Works, in New York, has ordered that the Erie, Champlain, Black River, Oswego, and Cayuga and Seneca canals be closed for the season on Friday, Nov. 30, at midnight, unless sooner closed by ice.

A Shimmering Veil Produced by Glistening Shafts.

Winter has begun early in Indiana. Trains of the Pittsburgh, Fort Wayne & Chicago were detained by snow near Valparaiso the fore part of last week. We have to go to Boston, however, for an esthetic winter. A reporter in that city visited the Boston & Maine station the other day, and sent back to the city editor the following sample of space writing:

"There came out of the north regions yesterday morning a whitened train on the Boston & Maine road, and as it rolled into the Union station all who saw it were attracted by the beauty of its spangled draperies. It was quite evident that it had come down from the frost-sheeted mountain sections of New Hampshire and Vermont, where Jack Frost has set up his winter establishment for the season. The car that appeared to have received the full force of the Ice King's assault was the one that brought up the rear end of the train. During the rush through his domains the air was filled with glistening shafts hurled from his towering embattlements at the flying invader. But they crumbled into diamond dust in the yellow light of the moon, and Boreas wove the shimmering particles into a veiling of gorgeous beauty that enveloped the cars in its frigid folds."

Prices for Jetty and Dredging Work.

The bids for jetty work and dredging at Sabine Pass, Tex., were from three contractors for jetty work and five for dredging, and were as follows: Dredging: R. R. Moore, Mobile, Ala., 9 cents per cubic yard; Charles Clarke & Co., Galveston, Tex., 13 cents; Theodore Doyle, 12 cents; Julius Hess, Detroit, Mich., 16⅓ cents; New York Dredging Co., 12½ cents. Jetty work: Hyatt & McReynolds, Sabine Pass, brush, 80 cents per square yard; riprap hearting, $2.50 per ton; riprap granite, $2.85 per ton; block granite, $4.55 per ton. Charles Clarke & Co., Galveston, brush, 79 cents per square yard; riprap hearting, $3.15 per ton; riprap granite, $3.15 per ton; block granite, $3.15 per ton. J. A. Davies, Galveston, brush, $1.25 per square yard; riprap hearting, $3.29 per ton; riprap granite, $4.25 per ton; block granite, $4.86 per ton. R. G. Ross, Jacksonville, Fla., brush, 95 cents per square yard; riprap hearting, $3.45 per ton; riprap granite, $3.60 per ton; block granite, $4.50 per ton.

Railroad Land Grants in Oregon.

A press dispatch from Ashland, Or., says that the Southern Pacific Co. is trying to secure patents to unoccupied lands, lying in the odd sections within the limits of the railroad's grant, which it has no right to. The road has recently been making surveys of lands and filing lists with the land office at Roseburg for the purpose of securing title from the Government. By the terms of the charter (of the Oregon & California) the Government gave to the company all of the odd-numbered sections within twenty miles on each side of the railroad, excepting mining lands. The people claim that the land now surveyed and claimed is unfit for agricultural use, and that the company is simply trying to get hold of valuable mineral lands, claiming that it is non-mineral. Special committees of two men have been appointed from each mining district to procure information regarding mineral lands in their districts and a large number of contests will be filed at once.

LOCOMOTIVE BUILDING.

The Boston & Albany has decided to order four more engines similar in design to the 8-wheel passenger engines recently built for the road by the Schenectady Locomotive Works and illustrated in a recent issue of this journal.

The New York, New Haven & Hartford will probably give out a contract for new locomotives this week. The number to be ordered is 25, and it is likely that the entire number will be awarded to the Rhode Island Locomotive Works.

CAR BUILDING.

The Mount Vernon Car Mfg. Co. secured the 225 cars to be built for the Mexican Central Railroad. The cars will have Wagner doors and Player brake beams.

The New York, New Haven & Hartford has let a contract for 100 box cars to the Keith Mfg. Co. A contract will also be let this week for 100 gondolas, probably to Osgood, Bradley & Co.

The Toledo, Ann Arbor & North Michigan Railway will build 600 new freight cars during the winter. It will also push the equipment of its old cars with M. C. B. couplers at the rate of about 50 cars a month.

BRIDGE BUILDING.

Burgessville, Ont.—The Grand Trunk Railroad will build an iron bridge over the Otter River, near this place.

Dixfield, Me.—The town authorities are considering the proposition made by a company to build a bridge across the Androscoggin River at that place worth $25,000, provided $8,000 of the stock will be taken by Dixfield people.

Hartford, Conn.—The contract for a new bridge over the Connecticut River in this city to the East Hartford Causeway, was awarded to the Berlin Iron Bridge Co., of East Berlin, last week, by the State Bridge Commissioners at $274,900. The superstructure of the new bridge is to be of iron and steel. The entire length is about 1,000 ft. It is to rest on two abutments, and five piers for the fixed spans and one for the left draw. The spans will be 158 ft. The roadway is to be 30 ft. in the draw. The foot walk will be 10 ft. Provision is made for a single track for the electric cars outside of the truss, the width being 12 ft. The contract calls for the completion of the new bridge by July 1, 1895. The old bridge which now crosses the Connecticut River at this point was built in 1818 and consists of six arches, more than 150 ft. each. The Legislature of 1889 passed an act providing for the purchase of the bridge and placing it in the control of the towns of Hartford, East Hartford, Glastonbury, Manchester and South Windsor. Sept. 11, 1889, in accordance with a decree of the Supreme Court, the bridge was surrendered by the bridge company to the towns in question. The amount awarded to the bridge company by the Commissioners was $210,000, divided among the five towns named.

Montreal, Que.—Plans for a new bridge over the Grand Trunk Railroad tracks at Mountain street, have been prepared by the City Surveyor, and will be submitted to the Road Committee at an early date. The design shows a bridge 720 ft. in length, with cut stone piers at both ends of 100 ft. and 70 ft.

New York City.—The Board of Estimate has approved plans for the bridge across the Harlem River from First avenue to Willis avenue, and has appropriated $30,000 to begin the work. The building of the bridge will be begun as soon as possible. According to the plans it is to extend from 125th street and First avenue to 134th and Willis avenue. It will be 2,600 ft. long, 70 ft. wide, with 300 ft. draw span. The cost is estimated at $1,663,000, and the cost of land for the approaches $100,000.

Ohio River.—Carrying out the policy decided upon at the last annual meeting, this company, operating a road from Wheeling to Huntington, W. Va., is replacing all the wooden bridges on its line with steel structures. When the road was opened in 1884, nearly all bridges were of wood, and they have stood the traffic very well, not one having shown signs of weakness. The increase of traffic, and the use of heavier rolling stock, have made more substantial structures necessary at several points, and it was decided to replace all bridges.

Ottawa, Ont.—The Lorne Bridge at Wellington street, up the Rideau Canal, is to be built this winter with an iron superstructure 500 ft. in length.

Tenders will shortly be asked by the Department of Public Works for the reconstruction of a bridge over Pond Creek between Gatineau Point and Hull, Que., and construction is expected to commence in a few weeks.

Preston, Ont.—The Galt & Preston Railway Co. have awarded the contract to Mr. A. McAustan, of Galt, Ont., for the construction of a bridge over the Speed River at this place.

Sussex, N. B.—Plans are being prepared for a new bridge to cross the stream running into the Kennebecasis River near this town.

RAILROAD LAW—NOTES TO DECISIONS.

Carriage of Goods and Injuries to Property.

In Texas the Supreme Court rules that it is error to instruct that a railroad which permits weeds to grow on its roadbed so as to conceal it from view is guilty of negligence, as matter of law, rendering it liable for injuries to a passenger caused by the collision of the train with a cow, which was concealed from the trainmen by the weeds.[1]

In Pennsylvania it is held that where the property occupied by plaintiff is flooded by the choking of a railroad culvert during a freshet, he cannot recover, provided defendant exercised ordinary care in keeping the opening to the culvert unobstructed, and in constructing it of sufficient capacity originally.[2]

In Wisconsin it is ruled that where plaintiff allowed his horses to be turned loose in a yard knowing that the fence between the yard and defendant's railroad track was down for several rods, he was guilty of such contributory negligence as will defeat an action for killing the horses after they had strayed upon the track.[3]

In New York it is ruled that where plaintiff's horse, while at pasture on the land of a third person adjoining defendant's railroad track, goes on the track at a point where defendant has neglected to maintain a fence, and is injured, defendant is liable therefor, since its duty to adjoining land owners to fence its track inures to the benefit of persons who acquire from such land owners the right to use their land.[4]

In the Federal Court it is decided that where the shying of a horse brings a vehicle into collision with the rear end of a train which wrongfully obstructs most of the street crossing, such shying cannot be regarded as the sole, proximate cause, and the jury is justified in finding that the obstruction directly contributed to the accident.[5]

In Missouri it is laid down that where plaintiff shipped coal over defendant's railroad from C to K, the rates charged being greater than rates advertised on the same date for shipments of coal over defendant's road in the same direction from M to K, a greater distance, his measure of damage is the extent to which shippers of coal from M., under similar circumstances, were given a preference.[6]

In this case plaintiff shipped coal over defendant's railroad from C to K, the rates charged being greater than rates advertised on the same date for shipments of coal over defendant's road in the same direction from M to K., a greater distance. The court holds this an unlawful discrimination, for which plaintiff could recover, though no coal was actually shipped from M to K on the day on which plantiff's coal was shipped, since defendant, in advertising a certain rate from M., must be deemed to have charged such rate within the law, making it unlawful for a carrier to "charge" a greater compensation for transportation of like kinds of property, under similar circumstances, for a shorter than a longer distance in the same direction.[6]

In Texas, in contract for shipment of stock, defendant company limited its liability to occurrences on its own line, which terminated at H. The evidence showed that the stock was negligently switched around in cars for several hours before being started; that, before reaching H., plaintiff notified defendant's agents that the stock would need food and water at that place, which was a feeding point, but the stock was immediately transferred to the connecting carrier, as had been previously agreed on by the two lines. Before reaching the next station, the animals had suffered so greatly that their value was permanently lessened. The evidence showed that, if they had been cared for at H., they would not have suffered The Supreme Court rules that defendant was liable, though the injury did not develop until after the stock had passed from its line.[7]

Injuries to Passengers, Employes and Strangers.

In Colorado the plaintiff, on entering defendant's train, was struck and jostled by three men, and, missing his pocketbook, he shouted for help, saying that he was being robbed, and accused the men of robbing him. The pocketbook was found on the floor, and restored to him, but the dispute was renewed, and plaintiff, though calling loudly for help, was set upon, and severely injured. No one came to his assistance. Held, that though defendant employed a proper number of train and depot men to protect passengers in ordinary contingencies, it was liable if any of these could have heard plaintiff, and failed to respond.[8]

In Indiana the Supreme Court holds that though a policeman is authorized by a railroad company to patrol its tracks, he is a trespasser in walking thereon for his own convenience on his way to enter on the discharge of his duties on his beat.[9]

In Pennsylvania it is ruled that where a passenger alighting from a train steps upon a bung from a keg lying on the platform, and sprains her ankle, no presumption of negligence on the part of the company arises.[10]

In Iowa it is held that though the rules of a railroad provide that a train run by special order shall not leave a station unless both conductor and engineer have a copy of the order, and that the order must always be shown to the fireman, a fireman on a work train which is so run is not guilty of contributory negligence because, though he knows that a passenger train, which is due, has not passed, he fails to object when the conductor orders the train to move out on the main track, where a collision with the passenger train occurs, in which the fireman is killed.[11]

In Missouri plaintiff had worked as switchman in defendant's repair yard for some years, and had daily switched cars onto a repair track, on the bed of which grass had been permitted to grow for years, as he knew. He also knew that, in repairing small pieces of wood and iron were liable to fall from the cars in the grass, so as not to be discoverable on closest inspection, but he had never requested that the grass be removed, and the company had never promised to do so. The Supreme Court rules that he assumed the risk of injuries caused by stepping on a small spiral car spring, which was concealed in the grass, and which rolled under his foot so as to cause him to fall between cars which he was coupling.[12]

In Virginia plaintiff, a brakeman, mounted a flat car to assist in side-tracking it, and, the train having backed into the siding, he cut the car loose, and signaled the train to leave it. Finding that the car did not clear the other track, he signaled the train to return and push the car in further. Plaintiff saw that the train was returning at fast speed, and put one foot between iron rails on the car and the end of the car, and kept the other foot on the outside so as to set the brake, and when the train struck the car the rails slipped forward and crushed his foot. Plaintiff signaled the engineer to lessen the speed of the train, but the latter could not see plaintiff on account of the position of the cars. If this signal had been made to a brakeman, who was in full view of plaintiff, it could have been communicated to the engineer. The Supreme Court holds that the plaintiff was negligent (1) in cutting off the car outside the clearance post (2) in placing his foot in such position and (3) in giving the signal to the engineer whom he knew could not see him.[13]

In Texas it is held that a railroad that knowingly puts in charge of a train, sent out to repair the track, after a storm, an engineer who had never before been over the road, is liable to its Roadmaster on the train for injuries caused by the engineer's running into a washout, where such accident resulted from the engineer's unfamiliarity with the road.[14]

In Texas it is held that a locomotive fireman, who knows of a rain and storm that washed away the railroad track, is not guilty of contributory negligence if he continues at his post of duty, unless he also has notice of the condition of the track which such rain rendered dangerous.[15]

In Iowa it is ruled that where a fireman, though warned by the engineer of the imminence of a collision, did not jump, and was killed in the collision, it is proper, in an action for his death, to charge that when a person finds himself suddenly exposed to great danger, and does what he thinks best for his safety, he is not guilty of negligence, though he may not have acted wisely.[16]

[1] S. A. & A. P. v. Long, 23 S. W. Rep. 499.
[2] Fick v. P. R. R., 27 A. 788.
[3] Petersen v. Wis. Cent. 56 N. W. Rep. 639.
[4] French v. W. N. Y. & P. 25 N. Y. S., 229.
[5] C. & N. W. v. Prescott. Fed. Rep. 237.
[6] Ft. S. & M. 24 S. W. Rep. 1002.
[7] H. & S. A. v. Herring, 24 S. W. Rep. 939.
[8] Wright v. C. B. & Q. 35 Pac. Rep. 196.
[9] Penn Co. V. Myers, 36 N. E. Rep. 96.
[10] Bernhardt v. Western Pennsylvania 28 Atl. Rep.
[11] Hass v. C. M. & St. P. 57 N. W. Rep. 894.
[12] Williams v. St. L. & S. F. 24 S. W. Rep. 782.
[13] R. & D. v. De Butts, 18 S. E. Rep. 837.
[14] M. Pac. v. Patton, 25 S. W. Rep. 339.
[15] Ft. W. & D. C. v. Wilson, 24 S. W. Rep. 686.
[16] Hass v. M. & St. P. 57 N. W. Rep. 894.

MEETINGS AND ANNOUNCEMENTS.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic & Pacific, annual, Boston, Mass., Dec. 13.
New York Lake Erie & Western, annual, New York City, Nov. 27.
New York, Pennsylvania & Ohio, annual, Cleveland, O., Dec, 5.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7:36 p. m. Address P. O. Box 333.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

American Institute of Electrical Engineers.

The November meeting of the Institute of Electrical Engineers was held on the 21st inst., at No. 12 West 31st street, New York City. A paper by Prof. G. D. Shepardson, of the University of Minnesota, on Suggestions for an Index of Engineering Literature, was read. There was also discussion on a paper read by title at the Philadelphia meeting on Reactance and Its Definition. In accordance with the usual plan a meeting of the western members was held on the same evening at the Armour Institute for the discussion of the same papers. The office of the secretary of the institute, which has been at 12 West 31st street since 1890, has been removed to the Havemeyer Building, No. 26 Cortlandt street, New York City, and the office will be open daily from 9 A. M., to 5 P. M. Members visiting the city are invited to avail themselves of the facilities of the office. It is convenient to the elevated railroad stations, and the Broadway cable line, and it is within a few blocks of the principal ferries of the railroads reaching Jersey City.

Civil Egineers' Society of St Paul.

A regular meeting of the Civil Engineers' Society of St. Paul, was held Nov. 5 at 8 p. m. Twelve members and five visitors were present. A resolution was passed thanking President F. W. Cappelen of the Minneapolis Engineers' Club for courtesies extended on the occasion of the Sault Ste. Marie excursion, Oct. 20. Mr. Chas. A. Alderman was elected to membership.

The subject of "Transition Curves," introduced at the last meeting, was continued by the reading of several letters from engineers of various parts of the country. An hour's general discussion followed, the substance of which will be prepared for publication.

At the request of President Wilson, Prof. W. R. Hoag outlined the present relations between the Minneapolis State University, the United States Coast and Geodetic Survey and the United States Geological Survey, touching the Geological and Topographical survey of the State. Pending an adjustment in December next of rather an

unsettled state of affairs in this matter of interest to engineers and citizens generally, a committee consisting of Mr. Hilgard, Mr. Woodman and Mr. Stevens was appointed to examine the facts in detail and report at the next meeing.

Mr. Louis Dunn then exhibited models of his safety devices for switches.

Engineers' Club of St. Louis.

At the meeting of Nov. 7, Vice-President Russell in the chair, 17 members and 7 visitors were present. Mr. Edward Flad introduced the following resolution and moved its adoption:

Resolved, That a Committee of Ten be appointed by the chair to report to the club a schedule of the customary charges made by engineers for services rendered either for consultation or expert work, reports, plans and specifications, etc., or for services by the month or year, with a view to establishing a record of the usual and limiting charges customary, rather than a proper schedule of charges, the chairman to be a member of the committee.

After discussion by Messrs. H. A. Wheeler, Philip Moore, E. Flad, W. H. Bryan, J. A. Ockerson, J. B. Johnson and S. B. Russell, the motion was carried. The chair appointed the following committee: E. Flad, J. B. Johnson, H. A. Wheeler, M. L. Holman, J. A. Ockerson, W. B. Potter, E. D. Meier, J. Pitzman, W. H. Bryan and S. B. Russell.

Prof. H. A. Wheeler then read a paper on "The Merz Process of Handling Garbage at the South St. Louis Works." Previous to 1891 the garbage had been dumped in the river, the quantity then being estimated at 40 tons a day. It now averages 150 tons daily, and has reached 300 on Mondays during the water melon season, the daily quantity per capita varying between one-third and one pound. All garbage is now reduced by the St. Louis Sanitary Company, the city paying them 9 cents per pound up to 200 tons daily, above which quantity it is reduced free of charge. The upper, or No. 1 plant, built four years ago, was originally of 40 tons' capacity; it was later increased to 75, and last summer handled as high as 100 tons. The No. 2 plant at the foot of Chouteau avenue was only temporary and has been abandoned. The No. 3 plant is located at the foot of Montana street in South St. Louis, and began operations in the spring of 1894. Its daily capacity is 200 tons. Prof. Wheeler explained in detail the system employed, devoting special attention to the methods of ventilation. In his opinion the plant was of great interest to engineers, and deserved the good opinion of the profession as representing an intelligent effort in the direction of a solution of a most difficult problem.

New York Railroad Club.

The annual meeting of the club was held on last Friday evening. The attendance was very large, considerably over 100 members being present. A very able paper was read by Mr. R. A. Parke, M. E., of the Westinghouse Air-Brake Co., entitled "Economy in Compressed Air Transmission for Commercial Purposes and for Air-Brake Purposes." Mr. Parke treated the subject in a very thorough manner and his paper when published in the Club's proceedings will be recognized as one of the most valuable contributions on the subject which has yet been compiled. He discussed in his introduction the physical laws relating to compressed air, and then gave a complete description of the different applications of compressed air and its economy, and of the design of air compressors for railroad and commercial purposes, treating specially of the principles governing its application in air-brake practice. The paper will be found a valuable collection of data on the subject of compressed air. In the discussion which followed, the economy of compressed air in railroad shops was emphasized. It was being satisfactorily used in cleaning cushions, windows and other parts of the interior of cars; in cleaning out boiler flues and for many other purposes.

The following officers were elected: President, Geo. W. West, Superintendent Motive Power, New York, Ontario & Western, succeeding Mr. R. C. Blackall, of the Delaware & Hudson Canal Co., who has been President for three years; First Vice-President, A. E. Mitchell, N. Y., L. E. & W. R. R.; Second Vice-President, W. H. Lewis, D. L. & W. R. R.; Third Vice-President, H. H. Vreeland, President Metropolitan Traction Co., and Treasurer, C. A. Smith.

The members of the Executive Committee are W. G. Waltson, Superintendent West Shore Railroad; Samuel Higgins, Superintendent Motive Power Lehigh Valley; W. C. Ennis, New York, Susquehanna & Western, W. W. Snow and Charles Fuller; Finance Committee, F. M. Patrick, Robert Dixon and D. M. Brady. Under a recent amendment of the Constitution, the Secretary is appointed by the Executive Committee of the Club, so there was no election at the meeting to that office.

The Engineers' Club of Philadelphia.

At the meeting of the club on Saturday, Nov. 17, a paper on the Highway Improvements in Philadelphia was read by George A. Bullock.

At the meeting on Nov. 3, President John C. Trautwine, Jr., in the chair, 98 members and visitors were present. The president announced that, as secretary of the association of engineering societies, he had issued to the prominent outstanding local and sectional engineering societies, including this club, a circular letter soliciting coöperation in the association's work. It was believed that if the coöperation of the still outstanding societies could be secured, the result would be a journal of such character as to secure the subscription of every engineer who wished to keep abreast of the times, and sufficient advertising, so that the cost of publication could be largely, if not wholly, covered by this source of revenue, and the assessments for publication purposes thus greatly reduced, if not entirely eliminated.

Dr. Henry Leffmann presented a paper entitled: "The Filtration of Public Water Supplies," of which the following is an abstract: The numerous methods of filtration may be arranged in two classes, in the first of which the water is subjected to a treatment by which a coagulum or precipitate is formed, and subsequently entangled in the filtering material. This, by enclosing the living germs, prevents their transmission to the effluent. This is filtration in the laboratory sense of the term, the filter merely acting as a straining agent. In the second method the water is supplied to the filter without previous treatment, and undergoes transformations in the filtering material similar to those occurring in soil, by which organic matter is consumed and rendered innocuous, while at the same time the microbes pass through the stages of development, age and death. Under proper conditions, the effluent from such a filter will be continuously almost sterile. The experiments of the Massachusetts State Board of Health clearly establish that the most satisfactory methods of water purification are to be obtained by making the filters represent the soil. A rather fine and somewhat angular sand is most suitable, and it is not unlikely that the chemical composition of the materials adherent to it has considerable influence on the efficiency of filtration. Some experiments lately made by the author, and now illustrated by a working model, seemed to show that a soil rich in iron oxide has a specially high filtering activity. Simple sand filtration, therefore, is a process entirely satisfactory for the filtration of public water supplies, and is especially adapted to the needs of large cities located on streams which are the drainage channels of a populated water shed. In conclusion, the author stated that the filtration of public water supplies is no longer in an experimental stage, but that by imitating the natural processes—the destruction of organic matter by microbes, and the destruction of the microbes themselves—we can render even a highly polluted water perfectly safe. Surface water should always be so treated, unless an engineering inspection shows absolute freedom from sewage pollution. Operations upon a large scale are now sufficiently numerous to indicate that what holds good in the laboratory can be applied in the largest filters, and the experience of Poughkeepsie shows that even the winters of our northern climates do not militate against its use. This method is for the purification of sewage, and is not applicable to water supply. It is also suitable for the disinfection of garbage.

Dr. Albert R. Leeds: In the work of the Water Commissioners of Philadelphia, from 1881 to 1884, when they covered the ground so thoroughly, they considered the source of supply from the Delaware River and tributaries, Perkiomen, Tohickon, and the entire country drained by the Schuylkill River; also the possibility of a subterranean supply. That the decision to retain the Delaware and Schuylkill as the sources of supply was right in 1884, is more than confirmed at the present time. Philadelphia is a typhus city. London was a cholera city. The great epidemic of London was due to the water supply. By Act of Parliament, in 1850, the seven water companies were compelled to filter their water supplies. The report of the Water Commissioners at that time was the most important and complete ever made. They examined every possible source within 150 miles, and even considered a supply from Wales. The decision was not to abandon, but to purify and filter.

Mr. John Birkinbine: The water supply from the Schuylkill valley is so thoroughly bad from different causes, that, strange to say, it in a measure purifies itself. The acids from the coal mines kill the microbes from the sewage. I believe that in future Philadelphia will be supplied with water by gravity, and the entire drainage area will have to be controlled. If the water supply is to be filtered it should be filtered at the source. Philadelphia does not use anything like the water it gets credit for. This does not come from any intentional error, but from wrong calculations as to the stroke and capacity of the pumps.

PERSONAL.

—Mr. W. R. Sweet, Master of Transportation of the Augusta Southern, has been appointed Assistant General Manager of that road, with headquarters at Augusta, Ga.

—Mr. Frank A. Seabert, for many years Superintendent of the Delaware, Lackawanna & Western, with headquarters in Buffalo, has retired from that position, and has gone to California.

—Mr. Walter T. Rupert, heretofore Foreman of Locomotive Repairs of the Detroit, Lansing & Northern, has been appointed Acting Master Mechanic, with headquarters at Ionia, Mich. He succeeds George A. O'Keefe, resigned.

—The reported appointment of W. N. Bannard as Division Superintendent on the New York Central Railroad at Buffalo, is incorrect. No recent action has been taken relative to accepting Superintendent Burrows's resignation. He has been on leave of absence for nearly two years.

—Mr. James Meehan, who was for many years superintendent of machinery on the Queen & Crescent lines, has been appointed Superintendent of Motive Power and Machinery on the South Carolina & Georgia Railroad. Mr. Meehan resigned from the Queen & Crescent about two years ago.

—Mr. J. M. Buckley, formerly Assistant General Manager of the Northern Pacific Railroad, with headquarters at Tacoma, Wash., died at Hot Springs, Ark., on Nov. 16. Mr. Buckley resigned from the Northern Pacific several years ago and has not since been in active railroad work. He leaves an estate valued at about $250,000.

—Mr. E. P. Vining, formerly Traffic Manager of the Union Pacific Railroad, and arbitrator of the Western Passenger Association, is to take full charge of the street car lines in San Francisco owned and controlled by the Southern Pacific Company. It is understood that he will receive $15,000 a year. He succeeds Mr. M. D. Stein, who has been General Manager of the company since the consolidation of the various lines.

—Mr. George Van Keuren has been appointed Superintendent of Transportation of the New York, Lake Erie & Western Railroad, succeeding Mr. C. R. Fitch, the present General Superintendent, who has been Acting Superintendent of Transportation for some time. Mr. L. C. Smith, Superintendent of the Tioga Division of the Erie Railroad, has been transferred to the superintendency of the Jefferson Division, succeeding Mr. Van Kueran.

—Mr. Joseph Lewis, the inventor of the Lewis locomotive valve motion, died at Kansas City, Mo., on Nov. 20. Mr. Lewis was born in England and in early life was connected with the firm of Lewis & Sons, engine builders at Manchester. Mr. Lewis came to this country in 1868, and lived at Chicago for the greater part of his life. His valve motion was very completely described and illustrated in the *Railroad Gazette* of April 27, 1894.

—Mr. M. E. Wallace, who has for the past two and a half years held the postion of Chief Draughtsman with the Chicago, Burlington & Quincy Railroad, at Aurora, has recently resigned and accepted a similar position with the Westinghouse Air Brake Co., at Wilmerding, Pa. Mr. F. H. Clark takes the position vacated by Mr. Wallace. Mr. Clark has been for the last four years associated with Mr. D. L. Barnes in engineering work in Chicago; and for a year and a half he has been a regular and frequent writer for the *Railroad Gazette*.

—We understand that Mr. F. M. Baker, General Superintendent of the Addison & Pennsylvania Railway, Addison, N.Y., is a candidate for a position as member of the State Railroad Commission of New York. His appointment will be an innovation. We do not know of a case in which a Commissioner has been appointed from the operating department of a railroad, or at least from any position above the grade of locomotive engineer; and yet it would seem as if this was exactly the place where old railroad officers would be of great use, not only to the railroads but to the country, and we trust that Mr. Baker will be successful, if he wants the office.

—Captain Thomas W. Mason, one of the three Railroad Commissioners of North Carolina, will retire from the Commission in January, as he will then have served four years as Commissioner, the term for which he was elected by the Legislature when the Commission was created in January, 1890. Captain Mason is a Democrat, while the Legislature which will elect his successor has an anti-Democratic majority, and will elect either a Republican or a Populist. J. C. Pritchard, a Republican, and an Attorney for the Southern Railway system, and J. C. L. Harris, a Raleigh lawyer, are prominently mentioned in connection with the place and it is likely that one of them will secure it.

—Mr. Eckley B. Coxe, who is at the head of the great coal firm of Coxe Brothers & Co., has resigned the Presidency of the Delaware, Susquehanna & Schuylkill Railroad, which was built by that company in 1892 to connect its mines with the line of the Philadelphia & Reading Railroad. Mr. Coxe has also resigned the presidency of Coxe Brothers' Iron Mfg. Co., and of other companies identified with the interests of Coxe Brothers & Co. No reason is given for the resignations beyond the fact that it was deemed advisable to have a practical railroad man in charge of the railroad. The presidency has been offered to Mr. Alfred Walters, General Manager of the New York, Lake Erie & Western Railroad, and we understand that he has accepted the office. He will resign from the Erie Railroad.

ELECTIONS AND APPOINTMENTS

Atchison, Topeka & Santa Fé.—At a meeting of the Directors of the road on Nov. 16, the resignations of Messrs. Wilder and Bonebrake were accepted and their places were filled by the election of ex-Governor T. A. Osborn of Kansas and H. R. Duval, President of the Florida Central & Peninsula Railway Co. It is expected that B. P. Cheney Jr., will be elected Chairman of the Board next week.

An order of the receiver's announces that the authority of D. B. Robinson, General Agent of the receivers, will embrace all matters except such as directly pertain to freight and passenger traffic, or to the legal department. W. B. Biddle is appointed Freight Traffic Manager for the receivers. W. F. White, Passenger Traffic Manager, and W. B. Biddle, Freight Traffic Manager, will both report directly to the receivers, and their authority will include all matters connected with the passenger and freight traffic, respectively, of the lines operated and controlled by the several receiverships.

Baltimore & Ohio.—The old Board of Directors was re-elected at the annual meeting this week by a vote of 153,577 shares, Mr. William L. Dixon, a Banker of Baltimore, taking the place of Charles J. M. Gwinn, deceased.

Buffalo, Rochester & Pittsburg.—Frederick J. Harrison has been appointed General Foreman of the shops, at Lincoln Park, N. Y.

Georgia, Carolina & Northern.—At the annual meeting of the stockholders of this road (which is a part of the Seaboard Air Line System), held at Atlanta, Ga., General R. F. Hoke, of Raleigh, N. C., was reëlected President, and William R. Tucker, of Raleigh, was elected a Director to succeed his father, the late Major Rufus S. Tucker. The business of the company has greatly increased during the past year.

Jacksonville, Louisville & St. Louis.—J. B. Stevenson having resigned the office of General Agent for freight traffic, that office is abolished. W. E. Crane is appointed General Freight Agent. The title of J. W. Daly will be General Passenger Agent.

Kalamazoo, Mich.—A special election was held Nov. 6, at which two propositions were submitted to the voters. One, authorizing the City Council to construct an electric lighting plant, was carried by yeas 1,878, to nays 1,397. The other proposition was to authorize the City Council to borrow $40,000, to be used in constructing such a plant, or for the purpose of lighting the city with electric lights or otherwise, through a contract, and this proposition also carried, yeas 1,868, nays 1,419. We are informed by the City Clerk that he is unable as yet to give any information as to the probable final action, on either proposition, that will be taken by the City Council.

Mahoning State Line.—The directors and officers of this company in Ohio are: Directors, James H. Reed and John G. Robinson, of Pittsburg; Myron H. Wood, E. F. Wood and James P. Wilson, of Youngstown, O. President, James H. Reed; Treasurer, John G. Robinson; Secretary, James P. Wilson.

Manhattan.—At the annual meeting of the stockholders of the company held in New York City, on Nov. 14, the following Directors were elected: R. M. Gallaway, Russell Sage, Samuel Sloan, George J. Gould, George Bliss, Frank K. Hain, Edwin Gould, Simon Wormser, Joseph Eastman, G. P. Morosni, Donald Mackay, Howard Gould. Mr. George Bliss was elected to fill the vacancy caused by the refusal of Mr. J. Pierpont Morgan to qualify after his re-election as a Director at the annual meeting last year. The officers were reëlected as follows: President George J. Gould, Second Vice-President, Frank K. Hain; Secretary and Treasurer, D. W. McWilliams. The Executive Committee consists of Russell Sage, Samuel Sloan, R. M. Gallaway, Edwin Gould, and the President. Expense Committee, Russell Sage, R. M. Gallaway, Edwin Gould, Howard Gould and the President.

New York, Lake Erie & Western.—George Van Keuren has been appointed Superintendent of Transportation of the N. Y., L. E. & W. R. R. Division, with office at Jersey City, N. J.

L. C. Smith has been appointed Superintendent of the Jefferson Division, vice George Van Keuren, promoted.

E. E. Loomis has been appointed Superintendent of the Tioga Division, vice L. C. Smith, transferred.

Ohio River & Charleston.—The following Directors were elected at a meeting of the purchasers of the Charleston, Cincinnati & Chicago, at Boston, last week: Samuel Hunt, of Cincinnati, President; J. J. Collier, Philadelphia, Secretary and Treasurer; Board of Directors, George H. Earle, Jr., A. B. Loeb, Simon A. Stern, J. J. Collier, Philadelphia; John Goldthwait, John C. Haines, R. M. Moss, A. F. Freeman, Boston; Job H. Jackson, Wilmington, Del.; Samuel Hunt, Cincinnati, and S. J. Kirkpatrick, Jonesboro, Tenn.

Oregon Railway & Navigation Company.—The circular of Receiver and General Manager McNeill, announcing the connection of T. W. Lee with this company, states that he is to perform such duties as may be assigned to him by the Receiver and General Manager. It was re-

ported that Mr. Lee's title would be General Passenger and Ticket Agent, but the circular does not bear out that report.

Peoria, Decatur & Evansville.—The Directors of the company have elected the following officers: Robert S. Anderson President; E. O. Hopkins Vice-President and W. J. Lewis Secretary.

Seaboard Air Line.—General Manager Winder announces the appointment of Carroll Smith as Superintendent of that company's terminals at Portsmouth, Va. Mr. Smith is a brother of the late O. V. Smith, Traffic Manager of the line, and was formerly Western Agent in Chicago.

South Carolina & Georgia.—James Meehan has been appointed Superintendent of Motive Power and Machinery.

Southern Railway.—Milton V. Richards has been appointed Land and Immigration Commissioner of the Southern Railway Co.

Zanesville & Ohio River.—The annual meetings of the stockholders and Directors of the Zanesville & Ohio River Railroad were held at Zanesville, Ohio, last Thursday. The old Board of Directors was re-elected. C. M. Vickers of New York, was chosen President, and F. A. Durbin of Zanesville, Secretary and Treasurer.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Atlantic Short Line.—This company, which proposes to build from Macon, Ga., to Colleton, S. C., has at present 12 miles of track laid, from Bruton, Ga., eastward, and the grading and trestling practically completed on about 60 miles more. The company has had a force at work completing grading and trestles for some weeks, and it is reported that track laying has commenced, and that at least a part of the road will be completed and put in operation at once. John R. Young, of Savannah, Ga., is President.

Batavia & Northern.—E. W. Emmons, of Batavia, N. Y., who is the active projector of this railroad north of Batavia, gives the assurance that the railroad will be constructed to Oak Orchard Harbor on Lake Ontario, 25 miles north of Batavia, if the town will grant the right of way asked and if a certain amount of stock is subscribed at Batavia. Mr. Emmons has interested New York and Brooklyn people in the project. Among these are W. H. Hazzard, President of the Fulton Bank, of Brooklyn, and Jacob Cole, Director of the Mechanics' Bank, of Brooklyn, with George Wingate, Robert Avery and James H. Coxe, of New York.

Bellaire, Zanesville & Cincinnati.—This company last year bought from the county commissioners of Muskingum County, Ohio, nine miles of narrow gage road, operated under lease, previously, between Zanesville, Ohio, and Cumberland, Ohio. A part of the purchase contract was that the company should make this part of the line standard gage within the year, and make the entire line to Bellaire, Ohio, standard gage within three years. This work is now well under way. The nine miles of purchased road has been graded and the rails are on the ground for the third track. A new route has been made from Cumberland, Guernsey County, to Temperanceville, Belmont County creek, to intersect the old line at Alledonia. This will shorten the distance between Zanesville and Bellaire and will open up the coal field of Eastern Ohio, known as the Pittsburgh No. 8 seam, which has an average thickness of six feet, and reached by shafting from 25 to 75 feet. The new route also does away with the heavy grades on the old line, reducing the average to 40 ft. to the mile, less than half that now encountered. The old narrow gage line by way of Alledonia and Woodsfield will not be abandoned, but will be used for the local traffic, and the present tracks will be used temporarily from Alledonia to Bellaire. These are to be abandoned finally for a shorter route down Captina creek and up the Ohio River to Bellaire, which will do away with the heavy grades at Jacobsburg and open up another coal field along Captina creek.

British Columbia Roads.—During the next session of the British Columbia Legislature measures will be introduced to encourage the building of railroads to the placer mining county in the north. There is promise of considerable railroad construction in the province, as, in addition to the contemplated extension of the Canadian Pacific in the Kootnay and O'Kannagan district south of the main line, there is a projected road from Ashcroft northward into the Cariboo country.

Buffalo, Rochester & Pittsburg.—The branch railroad to the quarries at Clearfield, Pa., is being constructed by this company, lessees of the Clearfield & Mahoning Railroad. It leaves the main line of that road four miles west of Clearfield and terminates at the Clearfield Quarrying Co.'s quarries—a distance of four miles. The grade is three per cent. Reed McAtee, Mehaffy, Pa., is the contractor. The grading commenced Sept. 1 and is about completed. The track laying has been commenced and will be fully completed about Dec. 20. The quarry is a ledge of white sandstone about 30 ft. high. About four million cubic yards of stone are in sight. Over 10,000 yards of this stone was used in 1893 by the Delaware, Lackawanna & Western Railroad, at Wilkesbarre, Pa., and 15,000 yards by the Lehigh Valley in arches and bridges on its Buffalo extension in 1891 and 1892. It is used along the Pennsylvania main line in all bridging.

Canadian Pacific.—The Canadian Pacific Railway will this fall survey a line of railroad from Eganville to French River, and thence to Spanish River, province of Ontario.

Several Canadian papers report that the company will extend a branch line from Sault Ste. Marie, Ont., to the rapids and build docks along the river shore.

Charleston, Clendennin & Sutton.—A deed of trust from this company to the Philadelphia Trust & Safe Deposit Co. for $3,000,000 was recorded in West Virginia last week. The deed covers the property of the company and insures the building of the extension from the present terminus at Clendennin to Sutton, W. Va., along the Elk River Valley. The officials assert that the line to Clay C. H., over half way, will be completed by June.

Chicago & Eastern Illinois.—A three-mile branch is under construction to reach what is known as the Mission Fields Mines, of the Consolidated Coal Co., southeast of Oakwood Station, Vermilion County, Ill. The grading was very light, and is completed. James Sheahan, of Afton, Iowa, is the contractor. Track is laid and gravel unloaded for surfacing.

Chicago, Superior & Pacific.—R. E. L. White, a lawyer of Washington, has taken up this project and is endeavoring to secure local aid from the various towns in Wisconsin through which it is proposed to build. Recently, with William Chadsey, one of the local projectors, who has kept the project alive for a good many years, he went over a considerable portion of the route in Wisconsin. Just what assistance they have been able to secure, if any at all, is a matter for future development. The charter gives those who hold it the right to a partially graded roadbed through about 50 miles of Wisconsin, southeast of Superior, Wis.

Chicago & Southeastern (Indiana).—The short extension from Carbon, south to Brazil, Ind., which is the chief town in the Clay County coal fields, is expected to be opened for traffic within a few days. All the construction work is completed.

Coast Railway of Nova Scotia.—The surveys have now been practically completed from Yarmouth, to Lockport on the south coast of Nova Scotia, the distance being 60 miles. The contract for building and equipping the entire road is in the hands of the Nova Scotia Development Co. The President of that company is John A. Brill, of the J. G. Brill Car Co., Philadelphia. About 17 miles of track are graded, with the culverts and small bridges all in. H. Sorette & Co., of Yarmouth, have the contract for building the stone work for the large bridges across the Salmon and Tusket Rivers. About 400 men are now at work. The general character of the work is easy; the maximum grade 1.5 per cent., and maximum curve 10 degrees. Grading will be continued as long as the weather permits, and it is proposed to commence track laying about April and to complete the entire road next season. A. H. Chadbourne is Superintendent of Construction at Yarmouth, N. S.

Colorado, Wyoming & Great Northern.—This company has been incorporated at Denver, Col., by W. T. Carpenter, T. E. Sanford, C F. Lass, M. O. Whitehead and J. P. Nesbitt. The proposed route is from Grand Junction through Garfield county and up the Green River to Green River City, on the Union Pacific Railroad, in Wyoming. Branches will be built to Provo City, Utah, and Meeker.

Columbia & Eastern.—Articles of incorporation of the company were filed in Washington by Colonel R. W. Mitchell, Henry C. Grady and C. W. Johnson, of Portland, Ore. The capital stock is placed at $500,000. The company proposes to construct a railroad from a point in Clatsop county, near the mouth of the Columbia River, through the valley of the Nehalem, then through Columbia, Washington, Multomah, Clackamas, Marion, Linn, Harney and Cook counties, to a point near the Snake River at Ontario, or near Owyhee. If practicable the company will purchase the Astoria & South Coast Railroad, running from Young's Bay to Seaside, and connect it with the proposed line.

Denver, Lakewood & Golden.—The extension of this line beyond Golden, a town near Denver, Col., has now reached Ralston Creek, 8½ miles north of Golden. The line was built under the contract of Samuel Newhouse, of Denver, and has just been accepted by the Directors. A considerable freight business is anticipated, a branch reaching three coal mines, a number of brick works and clay and lime beds. Passenger trains will not be run this season, but the road will be at once opened for freight traffic.

Findlay, Fort Wayne & Western.—The reorganization of this company was briefly reported last week. The road is now being completed into Fort Wayne, Ind., and a contract has recently been made with the Wabash Road for the use of the tracks and station of that company in the latter town. The grading has been completed from the present terminus of the operated road in Ohio to Fort Wayne and all the track has been laid except about three miles. It is expected that the extension will be ballasted and the road ready for passenger trains early in December. This extension is about 20 miles long and will give the company a total mileage of — miles.

The new company has been organized with first mortgage bonds amounting to $1,200,000 and second mortgage bonds amounting to $800,000, the bonds bearing four per cent. and five per cent. interest respectively. The first mortgage bonds of the old company amounted to $1,400,000, and the property was bid in under the foreclosure of these bonds by George Lord Day, of New York, who becomes President of the new company. Charles G. Patterson, the contractor for the road, and one of the officers, receives $470,000 of the first mortgage bonds, all of the other bonds being delivered to Mr. Day, President of the company.

Florida Central & Peninsula.—Messrs. Dade & Jones, civil engineers, are locating a branch of this road from Summerfield, 15 miles south of Ocala, due east to South Lake Weir, Fla., seven miles.

Gainesville, Rocky Point & Micanopy.—The construction of this railroad has been completed by the contractor, James M. Graham, of Gainesville, and the property is to be transferred to the officers within a few days. Passenger trains are now running from Gainesville south to Micanopy, Fla., the distance being 12 miles. The road is already doing a fair business in hauling oranges into Gainesville, from 800 to 1,200 boxes of fruit being carried daily.

Gulf, Beaumont & Kansas City.—The officers have closed a contract for 20 miles of new rails for immediate delivery to replace lighter rails between Beaumont and Buna, Tex. The old rails will be put down on the grade which is now being constructed between Buna and Jasper. The graders on the extension are still at work and will have the contract for 15 miles completed next month. It is expected that track laying on the grade already completed will be commenced within the next two weeks.

Harns Central.—Some Nova Scotia capitalists have lately been looking over the route of the proposed Harns Central Railroad, with a view of building the road. The proposed line extends from Truro to Windsor, N. S., by way of Midland.

Intercolonial.—The Dominion Government is calling for tenders to be received up to Dec. 3, for the construction of branch lines, as follows: Grading from Windsor Junction to Station 290, 5½ miles, and grading from Tuft's Cove, Dartmouth, N. S., via Lake William, to Station 290, 5½ miles, at the office of Mr. P. S. Archibald, Chief Engineer, Moncton, N. B., and at North Street Station, Halifax, N. S., at both of which places forms of tender may be obtained.

New Lisbon, East Liverpool & Southern.—This road, which was incorporated three years ago to build from New Lisbon, O., to the Ohio River, near East Liverpool, is being taken up by the company interested in the proposed bridge over the Ohio River at East Liverpool. The plan as outlined is to continue the new road from the Ohio River to Youngstown, where it will connect with the New York, Pennsylvania & Ohio. The plans for the bridge are completed and a preliminary survey has been made from the river to Youngstown.

New Roads.—A new line is to be built from the south of the Black River to Ferguson's Point, Que., also from a point in the township of Wright, passing through Upper Thorne Centre, Que., Shawville, and terminating at Portage-du-Fort.

Ottawa, Arnprior & Parry Sound.—Ten miles of this railroad, between Barry's Bay and the Opeongo Forks, passed under government inspection this week. The rails have been laid for a distance of 12 miles beyond the point of inspection. It is expected that trains will run to Long Lake, west of Ottawa, by Dec. 1. The contract for 60 miles west of Long Lake to Emsdale, Ont., will probably be let during the winter. G. A. Mountain, of Ottawa, is Chief Engineer.

Pennsylvania & Northwestern.—Civil Engineer S. Cameron Corson has been engaged to superintend the laying out of a branch road several miles in length in the vicinity of McGee's Mills, Pa.

Pennsylvania.—The company has applied to the Philadelphia Councils for an ordinance authorizing the company to cross, by overhead bridges 14 ft. in the clear, a number of streets in the Twenty-third and Twenty-fifth Wards, between Frankford Junction and the Delaware River. The road to be constructed is to connect the present tracks at Frankford Junction with the bridge to be built over the Delaware River.

Philadelphia & Lansdale.—A charter was issued by the State Department at Harrisburg, Pa., last week, to the railroad company to build a line from Philadelphia to Lansdale, 16 miles. The capital is $100,000, and the president is Robert A. Welsh, of Philadelphia.

Pomona, Siloam & Southern.—The incorporation of this company in Missouri was recently noticed. The officers are: H. D. Mackey, of Pomona, Mo., President; William Pitts, Vice-President; and William J. Kreybill, Secretary. The company has just been organized and has not yet commenced work. The eventual length of the road will be 300 miles. This winter the company will only build from Pomona, a station on the Kansas City, Fort Scott & Memphis Railroad, to the celebrated mineral springs, a pleasure and health resort, known as "Siloam Springs," in southwest Missouri.

Portsmouth Belt.—The Directors of the Portsmouth Co., which is a large land owner at Norfolk and Portsmouth, Va., have been authorized to make a subscription of over $54,000 to the stock of the River Front Railroad to build a belt line connecting Norfolk, Berkeley, Portsmouth and West Norfolk. It will connect the Norfolk & Western Railroad with the Seaboard Air Line, the Atlantic & Danville and the Norfolk & Carolina Railroad.

San Pete Valley.—The first passenger train over the extension south of Manti, Utah, was run last week to the coal mines of the Sterling Coal & Coke Co. This extension is eight miles long and was built to reach the mines of the above company near Morrison, Utah. The construction work has been in charge of Thomas P. Lewis as superintendent of construction. The work has been difficult, especially the line through the six-mile canyon. The railroad now operates over 50 miles of road from Nephi south to Morrison.

San Antonio & Gulf.—Mr. William Davis, President and General Manager, reports that on Monday of this week 18 miles of track was laid out of San Antonio, 40 miles graded, and 30 miles of rail altogether was on the ground. The total length of the proposed railroad from San Antonio to Galveston is 216 miles; about 70 miles has been located, and preliminary surveys for the whole line have been made. Construction was begun June 1, and it is proposed to push the enterprise through steadily to completion. The maximum grades are one per cent., and the route is considerably the most direct between San Antonio and Galveston.

St. Croix & Penobscot.—Mr. Charles I. Haynes, of Bangor, Me., has completed the survey of the proposed extension of 27 miles between Princeton and Tomah, to connect with the Maine Central. The route surveyed is straight and the grades are all easy, and it is hoped that means may be found to build this road in the spring. James Mitchell and George P. Wescott, of Portland, now control the road.

St. Joseph Valley.—The report that this short railroad in Southern Michigan had been purchased for the Michigan Central is corrected by the statement that the control has passed to a firm named Patterson Brothers at Chicago. The road is only 10 miles long from Buchanan to Berrien Springs, Mich.

Stillmore Air Line.—This company has in operation a line from Stillmore, Ga., to Collins, Ga., on the Savannah & Western, a distance of 20 miles. It is proposed to extend it at once from Stillmore to Swainsborough, a distance of about 13 miles, and the line is now being located. The grading and trestling are light and will probably be done by the company's force. President G. M. Brinson, Stillmore, Ga., is President, and Arthur Pew is Chief Engineer.

St. Louis, Vandalia & Terre Haute.—It is reported that the company is about to build a second track from St. Louis to Greenville, a distnce of 51 miles.

Terminal Railroad Association of St. Louis.—The proposed elevated structure to give the Chicago, Burlington & Quincy and the Cleveland, Cincinnati, Chicago & St. Louis connection into the Union station from the north, is under consideration by the Directors. The Terminal Co. recently authorized the issue of $1,500,000 of the bonds, chiefly to pay the cost of this work. The work is delayed by the failure to decide upon the location. It is understood that two routes are being considered. One plan would be to build the elevated structure from the Merchants' Terminal Elevated across the tracks in the yards east of Eighteenth street, and another from a point on the Merchants' Terminal north of the yards westward along Poplar street to the new station.

Toronto, Hamilton & Buffalo.—Construction work on this road at the Branford end of the line is to be commenced at once. Work has been going on at Hamilton for some weeks.

West Virginia Central & Pittsburg.—This company has a second party of engineers locating between Cumberland, Md., its present terminus, and Cherry Run, Berkeley County, W. Va. This route is the one originally selected for the eastern extension to tidewater. It will connect with the Western Maryland road at Cherry Run if this route is decided upon, and thus reach Baltimore. The company has two other routes under consideration, and over a year ago began construction on one route which would give it an eastern outlet over the Cumberland Valley and Pennsylvania, but this was abandoned. The resumption of work on this line would seem to indicate that an eastern outlet is to be secured by one of the two routes under consideration.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—A joint Executive Committee for the reorganization of the company has been formed by the representatives of the three existing committees, viz.: The General Reorganization Com-

mittee, the London Committee of Bondholders, and Messrs. Hope & Co., of Amsterdam. Mr. Edward King, the President of the Union Trust Co., which is the trustee of the general mortgage, has been added to this committee and made its Chairman. The other members of the committee are as follows: R. Somers Hayes, Edward N. Gibbs, George G. Haven, Adrian Iselin, Jr., C. Sligo de Pothonier, Robert Fleming, John Luden and Victor Morawetz. Edward N. Gibbs has been made Vice-Chairman, C. C. Beaman and Victor Morawetz have been made counsel, and H. Kobbe, Secretary. The Joint Executive Committee, having received the detail report made by Stephen Little, have begun active work in the preparation of a comprehensive plan for the reorganization of the Atchison and auxiliary lines.

Central of Georgia.—The new company to be organized as the successor of the old company is to be called the Central of Georgia Railway Co. This new company will endeavor to secure new leases of the Southwestern and the Augusta & Savannah Railroads at a five per cent. rental. The new securities to be issued are as follows: (1) First mortgage five per cent. bonds amounting to $7,000,000, to be a first mortgage on the road from Atlanta to Savannah, its equipment and the equity in the steamship properties. (2) Consolidated 5s, $13,000,000, to be a second mortgage on the main line, equipment and leaseholds, a first mortgage on the Montgomery & Eufaula, and a second mortgage on the Mobile & Girard, when titles thereto are acquired. This issue may be increased $2,000,000 at not over $500,000 a year for betterments and equipment. (3) General mortgage bonds, for $10,000,000, to be a first lien on the Savannah & Western, Chattanooga, Rome & Columbus, and Macon & Northern, and a lien subsequent to the other bonds above mentioned on the lines which they cover. They will bear 2½ per cent. interest for two years, increasing thereafter one-half of 1 per cent. per annum until the rate is 5 per cent. (4) Seven and one-half million dollars "A" income 5s. (5) Seven and one-half million dollars "B" income 5s. (6) Five million dollars common stock.

Chester & Lenoir.—The roadbed between Lenoir, N. C., and Chester, S. C., has been put in excellent condition. This road was formerly operated by the Richmond & Danville system, but for the past year the stockholders of the road have been operating it. The business of the road has greatly improved and it is now making some money.

East and West of Alabama.—Dr. H. M. Caldwell, President of the Elyton Land Co., has concluded a sale of the Highland avenue and Belt Road, a light railroad at Birmingham, Ala., to the Columbian Equipment Co., of New York, which owns the East & West Railroad of Alabama. The purchaser will extend the East & West road into Birmingham, and use the purchase for terminal facilities. This road now runs from Cartersville, Ga., to Pell City, Ala., 30 miles from Birmingham.

Georgia Southern & Florida.—This railroad will be offered for sale by the Receivers on the first Tuesday in March under a decision from the Superior Court. The upset price fixed is $4,500,000, but if this amount is not bid, the road is to be again offered for sale on the Third Tuesday at $3,750,000, and if not sold then, to be offered again on the first Tuesday in April, at $3,000,000, and if still not sold, to be sold on the third Tuesday in April to the highest bidder. The bonds of the road are largely held in Baltimore, and it is the expectation here that the bondholders will purchase the property and operate it. These bonds are now selling on this market at from 88 to 88½. The total bonded debt of the road is $3,420,000 first mortgage six per cent bonds.

Illinois Central.—The income from traffic for the three months ended Sept. 30, 1894 and 1893, is given in the following table:

	1894.	1893.	Dec.
Miles operated.....	2,888	2,888	
Gross receipts from traffic...	$4,392,675	$5,869,409	$1,476,734
Oper. expen. and taxes	3,343,393	3,898,941	555,548
Net earn.....	$1,049,282	$1,970,468	$921,186

The gross receipts for the month of October were $1,799,761 in 1894, $2,668,344 in 1893, and $1,878,110 in 1892.

Indianapolis, Decatur & Springfield.—The holders of about two-thirds of the Central Trust Co.'s certificates issued in exchange for the first mortgage six and seven per cent. bonds of the Railroad, have authorised their committee to accept the proposition made by Verilye & Co. the bankers to pay 130 per cent. with five per cent. interest for the certificates. The committee was also empowered to borrow whatever money was necessary to put the road in good condition and to repair the bridges, three of which were in an unsatisfactory condition, in case the negotiations with Vermilye & Co. did not go through.

Jacksonville, Louisville & St. Louis.—An agreement has been made with the Louisville & Nashville Railroad Company for the joint use of its main track between Drivers and Mt. Vernon, Ill., and terminal facilities at Mt. Vernon.

Lexington Belt.—The Lexington Passenger and Belt Railway at Lexington, Ky., has been sold to President M. E. Ingalls for the Chesapeake & Ohio Railroad, for $175,000.

Louisiana & Missouri River.—Shareholders of the railroad have ratified the agreement under which a controlling interest in the stock is turned over to the Chicago & Alton. The price paid by the Chicago & Alton is $29.50 per share, the par value being $100.

New York, Pennsylvania & Ohio.—The English voting trustees of the railroad have issued a statement respecting the company's relations with the New York, Lake Erie & Western. Since the failure of attempts to compel the Erie receivers by legal means to pay the company its rentals the trustees have agreed to certain modifications in the lease. They secure an increase in the minimum rent from $1,757,054 to $2,000,000, and the application of the $100,000 a year, now used in improving the line, to the payment of interest on bonds to be used for that purpose. With regard to the adjustment of the financial affairs of the company the trustees submit a scheme for the renewal of the prior lien bonds for forty years at not more than 4½ per cent. interest, thus reducing the interest by at least $120,000 a year. Further capital for improvements to be issued to an amount of $2,000,000 at 5 per cent., to be part of a $5,000,000 bond issue, $3,000,000 to be reserved for future requirements, but not to be issued before 1900, or without the sanction of the first mortgage bondholders. The first mortgage bonds are to be due in 1940, and only such interest as is earned will be paid. The first mortgage bonds will also be subordinate to the new capital to be created. The 1895 coupons are to be funded, and deferred warrants are to be exchanged for first mortgage bonds.

Rio Grande Southern.—Suit was recently brought in Denver by the National Bank of Commerce, of that city, asking for the appointment of a new Receiver. The present Receiver, Mr. Jeffery, makes the following statement in regard to the suit: The National Bank of Commerce is an unsecured creditor of the Rio Grande Southern for the amount of $25,000. There are other unsecured creditors amounting to about $360,000, and secured creditors amounting to nearly $400,000, making the floating debt about $782,000, being about $444,000 less than the floating debt when the Receiver was appointed in August, 1893. All creditors, except the National Bank of Commerce, desire the Receiver to continue to discharge his duties and have expressed satisfaction at the results thus far under the Receivership.

Roaring Creek & Charleston.—This company, which has 15 miles of railroad built and in operation from the West Virginia Central to the South through Randolph County, W. Va., was last week placed in the control of T. Bennett Phillips, of Philadelphia, Pa., as Receiver. It is understood that the building of the road will be continued, as it promises to be a valuable property when a few miles more have been built. The road is surveyed from a junction with the West Virginia Central & Pittsburg to Charleston, W. Va. It was planned to develop coal and timber resources.

Savannah, Americus & Montgomery.—The application of the Pennsylvania Steel Co. for a Receiver for the railroad has been denied by the Court at Montgomery and the injunction in the case has been dissolved. This decision removes an obstacle that stood in the way of an early reorganization of the property. The road is now in the hands of S. H. Hawkins, of Americus, and T. Edward Hambleton, of Baltimore, as Receivers.

Union Pacific.—The receivers have been authorized by Judge Sanborn, of the United States Circuit Court at St. Paul, to pay the past due interest on the first mortgage bonds on the Oregon Short Line and on the Utah Northern Railroad. Petitions by the receivers for authority to operate the properties covered by the Kansas Pacific consolidation first mortgage bonds and for authority to continue the operation of the Oregon Short Line and Utah Northern and other roads, and for a division of accounts under the several mortgages, was taken under advisement by the court.

Wheeling & Lake Erie.—A special meeting of stockholders will be held on Dec. 22 to consider whether assents shall be given to the lease of the Valley Road of Ohio, and to decide the question of increasing the capital stock $5,000,000.

Wisconsin Central.—Messrs. Whitcomb and Morris, have been authorized by the United States Circuit Court to issue $2,000,000 six per cent. receivers' certificates. The proceeds will replace the rentals which have not yet been collected from the Northern Pacific lessee, amounting to $466,000, and the cost of supplies and materials which had to be bought for the operation of the Wisconsin Central lines when they were recovered from the Northern Pacific receivers, a little more than a year ago. They will also provide for all necessary renewals and will pay off all the balance for unpaid improvement and equipment accounts which were outstanding in September, 1893.

The Receivers' report for the Wisconsin Central Co. shows that the receipts were $365,836, and the expenditures, $350,659, leaving a balance of $15,265. The balance for August was $44,005. The report for the railroad company shows that the receipts, including August balance of $58,481, amounted to $262,365. The disbursements were $164,665, leaving a balance of $97,699.

TRAFFIC

Traffic Notes.

The Illinois Board of Railroad and Warehouse Commissioners are considering the advisability of re-classifying the roads and making four classes instead of two as now, with a view to permitting the small roads to charge higher rates than now.

The principal railroads of Texas have arranged to have cotton, both flat and compressed, weighed under the direction of the Texas Car Service Association. Most of the weighing will be done at places where the cotton is compressed, and about 20 weighers will be appointed. It appears that in Texas, cotton is still generally billed at the estimated weight of 500 lbs. per bale.

A Pittsburg paper states that the Baltimore & Ohio has abandoned Linden station near Pittsburgh and may abandon Birmingham, Soho and Laughlin stations in the same territory before long, owing to a falling off in business due to the establishment of electric street car lines. It is said that Nimick station, on the Pittsburgh, Cincinnati, Chicago & St. Louis, will also be abandoned Nov. 25 for the same reason.

The merchants of Savannah, Ga., have agreed to establish a freight bureau, and will soon appoint a commissioner. In explaining the reasons for this movement, President W. G. Cann, of the Cotton Exchange, in his annual report said:

Our port can congratulate itself upon a most satisfactory showing of cotton movement. This is particularly so when the sharp and desperate, and we may almost say unscrupulous, railroad competition of the past year is considered. The over-construction of railroads in the boom era has brought about a bitter fight for existence during the recent scarcity of business. Piratical proceedings on the part of some roads made legitimate competition almost impossible, and Savannah lost some business which properly belonged to her. The question of how much cotton Savannah should handle is not entirely a matter of her facilities nor the energy of her merchants, but is largely dependent upon the "division of spoils," so to speak, among the railroads of the Southern Railway and Steamship Association. By an arbitrary and absolute assumption of power this association divides the cotton from all competitive points to each railway leading from such points and boldly proclaims that in such division distance "cuts no figure." This idea, carried out arbitrarily, as it is at present, is a most serious matter. As a means of assisting us in the solution of such matters as well as to correct other discriminations against Savannah, and to suggest means to extend the commerce of our city, there has been organized a bureau of freight and transportation.

Chicago Traffic Matters.

CHICAGO, Nov. 21, 1894.

A slight advance in eastbound all rail business last week is probably attributable to the advance in rates, a considerable amount of the tonnage appearing in this statement being that which was rushed through as "in transit."

Lake rates on grain advanced to 1½ cts. a bushel to Buffalo, with moderate movement.

The Central Traffic Association lines look for favorable results from the recent meetings at Cleveland, and in this city last week. The "Central Committee" has organized by the selection of Commissioner Blanchard as Chairman, and it is proposed to try the experiment in Central Traffic territory now being tried in Western territory of making this committee directly responsible for the maintenance of rates. The Central Traffic Association organization has been for some time utterly powerless to secure the maintenance of rates. It remains to be seen whether the new arrangement will work any better. So long, however, as the Big Four and Chesapeake & Ohio insist upon protecting export rates via Newport News, and the present divisions and arrangements for through rates via the Mississippi River crossings between Chicago and St. Louis continue in effect, there is apparently no likelihood of any better state of affairs.

Members of the Western Passenger Association have experienced such a storm of indignation on the part of the merchants over the recent advance in excess baggage rates that they will probably abandon the attempt. Already the Northwestern and the Rock Island have given notice of their return to the old rates. The trouble seems to be that the rates were advanced too much. A moderate advance probably would have stood.

Western Passenger Association lines have finally disposed of the question of the issuance of half-fare permits to clergymen and others for 1895 by leaving it with the individual roads to issue permits to regular clergymen actually in charge of churches, as heretofore on application endorsed by the local ticket agent, but to place the issuing of all certificates to evangelists, traveling ministers, etc., in the hands of the chairman. A motion to place all half-fare clergy permits in the chairman's hands was defeated. Chairman Midgley, who also has charge of the 1895 pass agreement, requests members not to extend this year's annual passes.

Eastbound second-class passenger rates are in as demoralized a condition as ever. There is little if any doubt that from $6 to $7 commission is being paid on the $16 second-class rate to New York.

In the case of the Chicago Great Western, accused of violation of the agreement in meeting irregular action of the Chicago, St. Paul, Minneapolis & Omaha and other St. Paul lines, Chairman Caldwell finds that the Great Western was justified in its course and fines the other lines $100, to be shared equally.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Nov. 17, amounted to 49,560 tons, against 44,965 tons during the preceding week, an increase of 4,595 tons, and against 55,238 tons for the corresponding week last year. The proportions as carried by each road were:

ROADS.	WEEK TO NOV. 17		WEEK TO NOV. 10.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	2,343	4.7	3,098	6.9
Wabash.....	3,882	7.8	3,726	8.3
Lake Shore & Mich. South..	4,550	9.2	4,342	9.6
Pitts., Ft. Wayne & Chicago.	6,565	13.3	5,006	11.1
Pitts., Cin., Chi. & St. Louis	7,273	14.7	7,331	16.3
Baltimore & Ohio.....	4,840	9.7	4,311	9.6
Chicago & Grand Trunk....	6,256	12.6	2,920	6.5
New York, Chic. & St. Louis	6,881	13.9	6,504	14.5
Chicago & Erie.....	5,608	11.3	5,760	12.8
C., C. C. & St. Louis.....	1,362	2.8	1,967	4.4
Totals.....	49,560	100.0	44,965	100.0

Of the above shipments 1,835 tons were flour, 15,173 tons grain and mill stuff, 12,615 tons cured meats, 10,611 tons dressed beef, 1,250 tons butter, 2,272 tons hides, and 4,488 tons lumber. The three Vanderbilt lines carried 27.8 per cent, the two Pennsylvania lines 28.1 per cent. Lake lines carried 38,893 tons against 23,795 tons last week.

The Louisville & Nashville Case.

At Cincinnati, Nov. 19, the case of the Interstate Commerce Commission against the Louisville & Nashville and other roads, to compel compliance with orders issued by the Commission fixing rates on freight from Cincinnati to Southern points, came up for hearing before the United States District Court. Judge Sage asked if the case could go over till after March 4th next, when one of the questions involving the right of the Interstate Commerce Commission to establish maximum rates for freight will be decided by the Supreme Court of the United States. Senator Edmunds, for the Commission, was willing to have a continuance if the Court issued an order compelling the roads to obey the Commission's orders. This counsel for the roads would not concede, and the hearing began.

The Western Passenger Association.

Another meeting has been called for Nov. 26 in Chicago, to consider the revival of a Trans-Continental Passenger Association, and this time it looks as though something may be accomplished. Officials of the Atchison and the Southern Pacific have so far come to an understanding regarding a settlement of their differences in regard to California business as to join in a request for a meeting.

The general feeling is that it may be found best to reorganize the present Western Passenger Association and extend its jurisdiction to the Pacific Coast. This plan would be more satisfactory to the Atchison than to have two independent associations.

Besides, the Western Passenger Association is at present in a precarious condition. The Missouri Pacific and the Rock Island have just given notice of their withdrawal, effective Nov. 29, on the ground that with the Union Pacific and Atchison out of the Association they cannot properly protect their interests; and the Chicago & Alton, Wabash, Chicago Great Western and Burlington, Cedar Rapids & Northern have also withdrawn from the Association. This means that the Association will have to be reorganized on a new plan. It is probable that the outcome will be the merging into a new association covering all traffic from the Mississippi River to Pacific Coast points. Such an Association plan is favored by Atchison, which has steadily declined either to enter a new association West of the Missouri River, or to rejoin Western Passenger unless the latter was extended.

Another reason for the extension of the existing Association rather than the formation of a new one, is the necessity for united action on the part of all the western lines in fighting the Canadian Pacific. The refusal of that line to assent to arbitration of west bound percentages of the immigrant business, is taken to foreshadow a close union between all the American trunk lines east and west of Chicago, with the avowed intention of bringing the Canadian road to terms if possible. The western roads have been no more successful in securing an agreement regarding eastbound commission payments than they were as regards westbound.